Archives of
PHYSICAL MEDICINE

Official Journal American Congress of Physical Medicine

(Formerly Archives of Physical Therapy)

29th Annual Session

AMERICAN CONGRESS OF PHYSICAL MEDICINE

September 4, 5, 6, 7, 8, 1951

SHIRLEY-SAVOY HOTEL DENVER, COLORADO

VOLUME XXXII JANUARY, 1951 NO. 1

American Congress of Physical Medicine

29th Annual

Scientific and Clinical Session

and

Instruction Seminar

September 4, 5, 6, 7 and 8, 1951

Official Headquarters

SHIRLEY-SAVOY HOTEL

Denver, Colorado

EXECUTIVE OFFICES

30 NORTH MICHIGAN AVENUE CHICAGO 2, ILLINOIS

INSTRUCTION SEMINAR

In Conjunction with the

29th Annual Scientific and Clinical Session

AMERICAN CONGRESS OF PHYSICAL MEDICINE

September 4, 5, 6 and 7, 1951

SHIRLEY-SAVOY HOTEL **DENVER, COLORADO**

TENTATIVE SCHEDULE

TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
September 4	September 5	September 6	September 7

WATCH THE ARCHIVES FOR ANNOUNCEMENT OF SUBJECT MATTER

Courses will be offered in two separate groups: One group of ten lectures will be offered on basic subjects and this group will be open only to physicians. A second group of ten lectures will present more general and clinical subjects. Physicians and therapists may register for the second group of lectures. Only those therapists registered with the American Registry of Physical Therapists or the American Occupational Therapy Association will be permitted to enroll for the instruction seminar. The charge for a single lecture is $2.00, for a full schedule of ten lectures, $15.00.

For full information and application form address

AMERICAN CONGRESS OF PHYSICAL MEDICINE

30 North Michigan Avenue **Chicago 2, Illinois**

CAMP Scientific Support Fitting Courses stress the importance not only of theory but also the practical application of knowledge in clinical "workshops." Above is shown a group of fitters being instructed in the practical fitting of a patient (pendulous figure type) with a Camp orthopedic back brace.

A BASIC CAMP CREDO

"Education before Sales"

"How skilled is the fitter who assumes the duty of carrying out my instructions when I prescribe a scientific support?"

Every physician is justified in asking that question.

This year will mark the 23rd annual series of Camp Scientific Support Fitting Courses under medical supervision. Beginning in New York City, they will be held in principal cities throughout the nation. Estimated enrollment will include over a thousand representatives from reliable stores in all parts of the country. These courses are conducted by our Training Director, Medical Director, Designer and a staff of registered nurses. In addition to the formal sessions the nurses are constantly instructing smaller groups and individuals in countless other cities.

Since 1929 we have trained more than 16,000 fitters in the United States and Canada. That is why Camp research, Camp design and Camp craftsmanship can provide the ultimate in service to the patient.

Camp Scientific Supports are sold and fitted in reputable stores in your community.

S. H. CAMP and COMPANY, JACKSON, MICHIGAN

World's Largest Manufacturers of Scientific Supports

Offices in New York • Chicago • Windsor, Ontario • London, England

Contents — Jan. 1951

Volume XXXII No. 1

ARCHIVES OF PHYSICAL MEDICINE
(Formerly Archives of Physical Therapy)
30 North Michigan Avenue, Chicago 2, Illinois

Published monthly at Chicago, Illinois, by American Congress of Physical Medicine.

Entered as Second Class Matter, February 15, 1945, at the Post Office at Chicago, Illinois, under the Act of March 8, 1879.

ORIGINAL ARTICLES

Richard Kovács, M.D., 1884-1950 9

Physical Medicine and Rehabilitation in Europe. Frank H. Krusen, M.D. 10

Measurement of Whirlpool Temperature, Pressure and Turbulence. F. A. Hellebrandt, M.D.; Sara Jane Houtz, M.S., and Robert N. Eubank 17

New Hydraulic Exercise Table. Arthur L. Watkins, M.D. 27

Exercise in the Treatment of Asthma. Frances Baker, M.D. 30

Management of Decubitus Ulcers in the Paraplegic Patient. Gordon S. Letterman, M.D.; Charles S. Wise, M.D., and William Carey Meloy, M.D. 34

Consideration of Health Resorts by the Council on Physical Medicine and Rehabilitation. Howard A. Carter, M.E. 37

Standing Committees, American Congress of Physical Medicine 39

•

Medical News 40

•

Editorials 41

•

Book Reviews 47

•

Physical Medicine Abstracts 51

•

EDITOR OF THE MONTH

GEORGE MORRIS PIERSOL, M.D.
Philadelphia, Pa.

Printed in U.S.A.

APPROVED SCHOOLS FOR PHYSICAL THERAPISTS *

Council on Medical Education and Hospitals of the American Medical Association

Name and Location of School	Medical Director and Technical Director	Entrance Requirements **	Duration of Course	Time of Admission	Maximum Enrollment	Tuition	Certificate, Diploma, Degree
Childrens Hospital, Los Angeles[1]	S. S. Mathews, M.D. Mrs. Sarah S. Rogers	a-b-d	14 mos.	Sept	14	$300	Cert. or Degree
College of Medical Evangelists, Los Angeles[1]	Fred B. Moor, M.D. R. William Berdan	a-b-c	15 mos.	Sept	16	$300	Cert. or Dipl.
University of Southern California, Los Angeles[1, 5]	Charles L. Lowman, M.D. Miss Charlotte W. Andersc	a-b-e c-d-HS	14 mos. 1-4 yrs.	Sept SeptFeb	20	$662 $18 per unit[7]	Certificate Cert. & Degree
University of California Hospital, San Francisco[1]	Lucile M. Eising, M.D. Mrs. Margery L. Wagner	d	12 mos.	Sept	16	$220[6]	Cert. or Degree
Stanford University, Stanford University, Calif.[1]	W. H. Northway, M.D. Miss Lucille Daniels	a-b-d	12 mos.	Varies	18	$620	Cert. or Degree
University of Colorado Medical Center, Denver[1]	Harold Dinken, M.D. Miss Mary Lawrence	a-b-d	12 mos.	Sept	12	$300[6]	Cert. or Degree
Northwestern University Medical School, Chicago	Emil D. W. Hauser, M.D. Miss Gertrude Beard	a-b-d	12 mos.	Oct	16	$450	Certificate
State University of Iowa Medical School, Iowa City[1]	W. D. Paul, M.D. Mrs. Olive Farr	e	12 mos.	Sept	15	$200	Certificate
University of Kansas School of Medicine, Kansas City[1]	Donald L. Rose, M.D. Mrs. Ruth G. Monteith	a-b-d	12 mos.	FebSept	15	$ 80[6]	Cert. or Degree
Bouvé-Boston School of Physical Education, Medford, Mass.	Howard Moore, M.D. Miss Constance Greene	H.S.	4 yrs.	Sept	15	$550	Dipl. & Degree
Simmons College, Boston	W. T. Green, M.D. Miss Janet B. Merrill	H.S.-e	1½-4½ yrs.	Sept	25	$550	Dipl. or Degree
Boston University College of Physical Education for Women, Sargent College, Cambridge, Mass.	Kenneth Christophe, M.D. Miss Adelaide McGarrett	H.S.-e-d	1-4 yrs.	Sept	30	$450	Cert. or Degree
University of Minnesota, Minneapolis[1]	M. E. Knapp, M.D. Miss Ruby M. Green	H.S.	4 yrs.	Sept	16	$580[6]	Degree
Mayo Clinic, Rochester, Minn.[1]	Earl C. Elkins, M.D. Harry Keown	a-e	12 mos.	Sept	30	None	Certificate
Washington Univ. School of Medicine, St. Louis[1]	Sedgwick Mead, M.D. Miss Beatrice Schulz	c	2 yrs.	Sept	12	$450[6]	Degree
St. Louis University School of Nursing, St. Louis[1]	A. J. Kotkis, M.D. Sister Mary Imelda	H.S.	4 yrs.	JanSept	10	$388	Degree
Albany Hospital, Albany, N. Y.	J. W. Ghormley, M.D. Miss Catherine Graham	a-b-d	12 mos.	Sept	6	$250	Certificate
Columbia University College of Physicians and Surgeons, New York City[1]	William B. Snow, M.D. Miss Floy Pinkerton	a-c-e	1-2 yrs.	Sept	50	$710	Cert. or Degree
New York University School of Education, New York City[1]	George G. Deaver, M.D. Miss Elizabeth Addoms	a[2]-b-d	12 mos.	Sept	40	$600	Cert. & Degree
Duke Hospital, Durham, N. C.[1]	Lenox D. Baker, M.D. Miss Helen Kaiser	a-b-d	15 mos.	Oct	12	$350	Certificate
D. T. Watson School of Physiatrics, Leetsdale, Pa.[1]	Jessie Wright, M.D. Miss Kathryn Kelley	a-b-d	12 mos.	Oct	30	$300	Diploma
Graduate Hospital of the University of Pennsylvania, Philadelphia[1]	George M. Piersol, M.D. Miss Dorothy Baethke	a-b-d	12 mos.	Sept	20	$400	Certificate
University of Texas School of Medicine, Galveston[1]	G. W. N. Eggers, M.D. Miss Ruby Decker	b-d	12 mos.	Jan	8	$163[6]	Certificate
Hermann Hospital, Houston[1]	Oscar O. Selke, Jr., M.D. Mary Elizabeth Kolb	a-b-d	12 mos.	Oct	12	$300	Cert. or Degree
Baruch Center of Physical Medicine of the Medical College of Virginia, in affiliation with Richmond Professional Institute, Richmond[1]	Walter J. Lee, M.D. Miss Susanne Hirt	H.S.-a-b-c-d-e	1-4 yrs.	Sept	54	$275[6]	Dipl. or Degree
University of Wisconsin Medical School, Madison	Harry Bouman, M.D. Miss Margaret A. Kohli	a-b-c H.S.	12 mos. 4 yrs.	FebSept Sept	20 20	$120[3]yr $120[3]yr	Certificate Cert. & Degree
Medical Department — U. S. Army — Medical Field Service School, Brooke Army Medical Center, San Antonio, Texas, and	James E. Tate, Lt. Col., M.C. Agnes P. Snyder, Major, WMSC	h	12[4]	Nov.	20	None	See Below
Fitzsimons Army Hospital, Denver, Colorado or	Harold B. Luscombe, Col., M.C. Olena M. Cole, Maj., WMSC	Completion MFSS	12[4]	June	10	None	Certificate
Walter Reed Army Hospital, Army Medical Center, Washington, D. C.	John H. Kuitert, Colonel, M.C. Brunetta Kuchlthau, Maj., WMSC	Completion MFSS	12[4]	June	10	None	Certificate
Cleveland Clinic Hospital, Cleveland, Ohio	Shelby G. Gamble, M.D. Miss Mildred Heap	a-b-d	12 mos.	Oct.	12	$200	Diploma

** Courses are so arranged that any of the entrance requirements will qualify students for training. a = Graduation from accredited school of nursing; b = Graduation from accredited school of physical education; c = Two years of college with science courses; d = Three years of college with science courses; e = Four years of college with science courses. H.S. = High school graduation. h = Baccalaureate degree with major in physical education or the biological sciences.

* Reprinted in part with permission, J. A. M. A. 140:103 (May 7) 1949.

1. Male students are admitted.
2. R.N. plus one year college.
3. Nonresidents charged additional fee.
4. 12 months includes training at the Medical Field Service School and Fitzsimons or Walter Reed General Hospitals.
5. Students may transfer into the degree course at the Freshman, Sophomore, Junior or Senior Level. All are held responsible for requirements as listed in curriculum outline. This refers to professional as well as nonprofessional courses.
6. First year—$450. Second year—$325.
7. Masters Degree: 28 units at $20 per unit.

APPROVED SCHOOLS FOR OCCUPATIONAL THERAPISTS

Council on Medical Education and Hospitals of the American Medical Association

NOTE: The duration of the course is expressed in academic years.

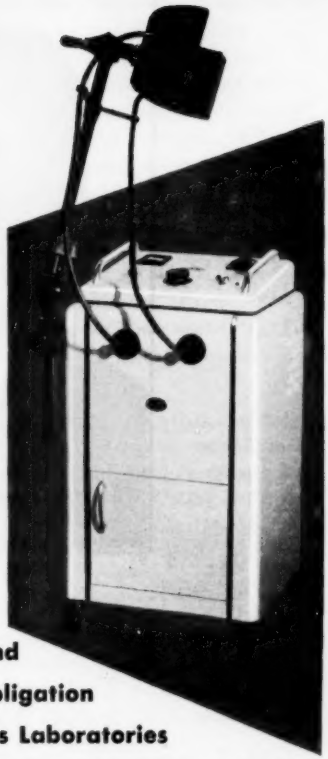
Name and Location of School	College Affiliation	Duration of Course	Classes Start	Entrance Requirements	Tuition Per Year	Certificate, Diploma	Graduates in 1947
University of Southern California, 923½ 35th Place, Los Angeles	University of Southern California	2 yrs. 5 yrs.	FebSept FebSept	Degree High sch.	$420 $450	Certificate Cert.&B.S.	22
Mills College, Oakland, Calif.	Mills College	3 yrs.	FebSept	Degree	$200 $550	Certificate	....
San Jose State College, San Jose, Calif.	San Jose State College	1½ yrs. 3¼ yrs.	Varies Varies	Degree High sch.	$ 21 $ 21	Certificate Degree	10
University of Illinois College of Medicine, 1853 W. Polk St., Chicago	University of Illinois	5 yrs.	Feb	High sch.	$152	B.S.	14
University of Iowa, Iowa City, Iowa	State University of Iowa, College of Medicine	5 yrs.	.....	High sch.	$ 85	Cert.&Deg	
University of Kansas, Lawrence	University of Kansas	2 yrs. 4 yrs.	FebSept FebSept	Degree High sch.	$131 $131	Certificate B.S.	10
Boston School of Occupational Therapy, 7 Harcourt St., Boston	Tufts College	2 yrs. 5 yrs.	Sept Sept	Degree High sch.	$500 $450	Diploma B.S.	13
Wayne University, 4841 Cass, Detroit, Mich.	Wayne University, College of Med., Coll. of Liberal Arts, Coll. of Education	5 yrs.	.....	High sch.	.....	.....	
Kalamazoo School of Occupational Therapy, Western Michigan College of Education, Kalamazoo	Western Michigan College of Education	1½ yrs. 4 yrs.	FebSept FebSept	Degree 1 yr. coll.	$127 $127	Diploma Degree	20
Michigan State Normal College, Ypsilanti	University of Michigan	5 yrs.	Varies	High sch.	$118	Cert.&Deg.	8
University of Minnesota, Church Street, Minneapolis	University of Minnesota	4 yrs.	.....	High sch.	$360	B.S.	
College of St. Catherine, St. Paul, Minn.	The College of St. Catherine	3½ yrs.	Varies	1 yr. coll.	$210	Degree	4
Washington University School of Medicine, St. Louis	Washington University	3 yrs.	Sept	2 yrs. coll.	$400	Degree	10
University of New Hampshire, Durham	Univ. of New Hampshire	5 yrs.	Sept	High sch.	$160	Cert.&Deg.	6
Columbia University College of Physicians and Surgeons, 630 W. 168th St., New York City	Columbia University	1½ yrs. 2½ yrs.	Sept Sept	Degree 2 yrs. coll.	$450 $450	Certificate Degree	28
New York University School of Education, 100 Washington Sq. E., New York City	New York University	4½ yrs.	FebSept	High sch.	$500	Cert.&Deg.	20
Ohio State University, Columbus	Ohio State University	3 yrs.	Quarterly	High sch.	$105	Degree	21
Philadelphia School of Occupational Therapy, 419 S. 19th St., Philadelphia	University of Pennsylvania	1½ yrs. 3 yrs.	Sept Sept	Degree 1 yr. coll. High sch.	$500 $500 $600	Diploma Diploma	35
Texas State College for Women, Denton, Tex.	Texas State College for Women	5 yrs.	FebSept	High sch.	$150	Degree	13
Richmond Professional Institute, 901 W. Franklin St., Richmond, Va.	Medical College of Virginia	1½ yrs. 3 yrs.	Sept Sept	Degree 1 yr. coll.	$200 $200	Certificate Certificate	20
College of Puget Sound, Tacoma, Wash.	College of Puget Sound	3 yrs. 5 yrs.	FebSept FebSept	Degree High sch.	$350 $300	Certificate Cert.&Deg.	
University of Wisconsin, Madison	University of Wisconsin	4 yrs.	FebSept	High sch.	$320	Cert.&Deg.	8
Milwaukee-Downer College, Dept. of Occupational Therapy, 2512 E. Hartford, Milwaukee	Milwaukee-Downer College	2½ yrs. 4 yrs.	Sept Sept	1 yr. coll. High sch.	$300 $300	Diploma Dipl.&Deg.	22
Mount Mary College, 2900 Menomonee River Dr., Milwaukee		Varies	Sept	Degree	$335	Certificate	15
University of Toronto, Dept. of University Extension, Toronto, Ont., Canada	University of Toronto	5 yrs. 3 yrs.	Sept Sept	High sch. 1 yr. coll.	$260 $222	B.S.Deg. Diploma	110
Colorado Agricultural and Mechanical College, Fort Collins, Colorado		5 yrs.	Sept	High sch.	.....	B.S.	

DO YOU WANT THE BEST

with economical cost?

APPARATUS FOR PHYSICAL MEDICINE

COMPLETE LINE



MEDITHERM SHORT WAVE

This is the quality line of short wave diathermy. Choice of three F. C. C. approved models of crystal controlled or non-crystal controlled units. The highest in performance at a reasonable price.

MEDIQUARTZ COLD ULTRA-VIOLET

The most complete line of ultra violet generators for the doctor or hospital. Body and localized irradiation, intracavity irradiation and air sterilization.

MEDI-SINE

An electronic low voltage wave generator with all fundamental currents, true "slow sinusoidal", automatic polarity reversal at each alternate impulse. Offers all practical therapeutic wave forms.

For full information—and free trial without obligation —write Dallons Laboratories for the name of your local dealer.

Dallons ENGINEERED

DALLONS LABORATORIES

5066 SANTA MONICA BOULEVARD • LOS ANGELES 27, CALIFORNIA

RICHARD KOVÁCS, M.D., 1884-1950

RICHARD KOVÁCS
1884-1950

The close of the year 1950 brought to an end the distinguished career of Dr. Richard Kovács, for many years Secretary of the American Congress of Physical Medicine, member of the editorial board of the ARCHIVES and consultant to the Council on Physical Medicine and Rehabilitation of the American Medical Association. Dr. Kovács died in New York City on Dec. 29, 1950, after a long illness.

Dr. Kovács was born at Nagybecskerek, Hungary (now Jugoslavia) on May 5, 1884. He entered the Royal Hungarian University, Budapest, in 1901 and studied there for two years; in 1903 he matriculated in the Kaiser Wilhelm University, Berlin, Germany, but the next year he returned to Budapest and received his medical degree in 1906. After internships and clinical training in Budapest and Vienna and service as ship's surgeon for the Cunard and Hamburg American Lines, he came to the United States in 1909 and was naturalized in 1915. Beginning his American career as clinical assistant in the outpatient department in Lenox Hill Hospital in New York City, he served in numerous capacities in various hospitals in the New York area, gradually narrowing his practice to physical medicine. During World War I he was an examining physician for the Selective Service; in World War II he was an instructor in military postgraduate medical courses. From 1926 to 1930 he was adjunct clinical professor of physical medicine in the Polyclinic Medical School and Hospital; from 1930 to 1940, clinical professor, and after 1940, professor.

Dr. Kovács was a pioneer member of the Congress and when the American Board of Physical Medicine was established he became an original member of the Board and was among the first group of specialists certified by the Board. In recognition of the value of his contributions in the field of Physical Medicine, the American Congress of Physical Medicine awarded him the gold key of merit. He was also the original editor of the "Year Book of Physical Medicine," serving in that capacity from 1938 to 1947. In addition to his contributions in his role of editor of the "Year Book" and member of the editorial board of the ARCHIVES, he was the author of many articles on physical medicine and wrote two of the outstanding texts in the field, "Electrotherapy and Light Therapy" (Lea & Febiger, 1932, sixth edition, 1949) and "Manual of Physical Therapy." (Lea & Febiger, 1932; third edition, 1944).

The passing of Dr. Kovács leaves a gap in the ranks of physical medicine that will be hard to fill.

PHYSICAL MEDICINE AND REHABILITATION IN EUROPE *

FRANK H. KRUSEN, M.D.

Section on Physical Medicine and Rehabilitation, Mayo Clinic

ROCHESTER, MINN.

This report is based on general impressions obtained during a rapid medical lecture tour through ten European countries during April and May, 1950. This trip necessitated such rapid travel that it was possible to see only a limited number of centers and to obtain only general impressions of the economic and social status of the countries which were visited. One was able to obtain only brief glimpses of the present status of medical practice and the growth of physical medicine and rehabilitation in these countries following the devastations of World War II.

Zurich, Switzerland

The first city to be visited was Zurich, Switzerland, where Dr. J. Christian Terrier, a former Mayo Foundation exchange fellow in physical medicine, conducted a tour through the University Institute of Physical Therapy and the School of Medicine of the University of Zurich. The institute is under the direction of the professor of physical medicine, Dr. Albert Böni, and his assistants, Dr. Jung and Dr. Wiederkehr. The physiatrists at the University Institute are particularly interested in rheumatology and Professor Böni and his associate, Dr. J. Kaufmann,[1] have made special studies on rheumatic headache. Professor Böni[2] has studied the physical treatment of rheumatic diseases, and Jung and Böni[3] have made special studies on the blood sugar in rheumatic diseases.

Since Switzerland is a region in which there are many spas, the institute is interested particularly in applications of hydrotherapy. There is an elaborate sauna bath. Also there is extensive use of therapeutic pools and packs of various types. There is a well equipped department of electrotherapy, and corrective exercises are also well employed. Physical therapists are trained in a medically supervised technical school associated with the institute.

In the research laboratories of the institute, Dr. H. Fritz-Niggli[4] was studying the effects of ultrasonic waves on the mutation rate of Drosophila (fruit fly). Research workers at the institute were also inaugurating preliminary studies on the effects of microwave diathermy.

The teaching of undergraduate medical students in physical medicine is well developed throughout Switzerland, and Dr. Victor Ott,[5] of Zurich, whom I met later in London, has pointed out that "since 1940 education in physical medicine, including medical hydrology and climatology, has been compulsory for all medical students. Thus there are chairs for physical medicine in all

* Read at the Twenty-Eighth Annual Session of the American Congress of Physical Medicine, Boston, Aug. 31, 1950.

1. Böni, A., and Kaufmann, J.: Der rhermatische Kopfschmerz, Ärztliche Monatschefte f. berufliche Fortbildung **5**:191 (Mar.) 1948.

2. Böni, A.: Der Einsatz der physikalischen Therapie in der Rheumabekämpfung, Schweiz. med. Wchnschr. **79**:1159 (July) 1949.

3. Jung, A., and Böni, A.: Blutzuckerbelastungskurven bei verschiedenen rheumatischen Erkrankungen, Schweiz. med Wchnschr. **80**:185 (Jan.) 1950.

4. Fritz-Niggli, H.: Die Einwirkung des Ultraschalls auf die Entwicklung und Mutationsrate der Taufliege (Drosophila melanogaster), Arch. f. phys. Therap. **2**:56 (Jan.) 1950.

5. Ott, Victor: Present Swiss Concepts of Rheumatism and Physical Medicine, Ann. Rheumat. Dis. **5**:206 (Dec.) 1946.

medical faculties; three of these are professorships, yet several institutes for physical therapy are dependent upon other hospital departments. At Geneva and Basle there are separate departments; but only at Zurich is there a fully independent clinical institute with departments for in-patients and out-patients."

Baden, Switzerland

A visit was made to the ancient Swiss health resort at Baden, which is a suburb of Zurich. This health resort is built around sulfur springs of great antiquity. Baden has been a health resort for more than 2,000 years. The Roman soldiers, after their invasion of northern Europe, brought their wounded back to the sulfur baths of Baden for treatment.

At the Freihof Volksheilbad, Dr. Terrier and his assistant, Dr. Levy, devote their attention to the rehabilitation of patients having arthritis and to the rehabilitation of amputees. Patients having such chronic diseases as cerebral palsy and multiple sclerosis are brought from all over Switzerland as well as from France and Germany for treatment at this famous spa. The beautiful Kurhaus provides a center where crippled persons may refresh themselves with good food in a pleasant garden or in the attractive dining hall while listening to an excellent orchestra. Attractive gardens and pleasant solariums make Baden an especially delightful health resort.

Lucerne, Switzerland

Lucerne is another beautiful health resort which is especially attractive because of its charm and its antiquity.

It was quite evident that Europeans have a much greater appreciation of their health resorts than Americans have of their excellent spas. At the Swiss spas, there is a superb blending of physical therapy, climatotherapy, dietotherapy and music therapy with routine medical care which might well be emulated in America. Unfortunately, in most American health resorts as compared with European health resorts, they tend, in response to the wishes of most Americans, to substitute exhausting and vigorous sports for mild therapeutic exercise, cocktail hour for tea time and strenuous modern music for soothing classic music. Frequently also Americans neglect the medical aspects of the spa routine almost entirely.

Copenhagen, Denmark

Physical medicine in Denmark is led by Dr. Svend Clemmesen and his many associates at Kommunehospitalet in Copenhagen. The work of this group is very impressive. Among Dr. Clemmesen's many medical associates can be named such outstanding scientists as Dr. Fritz Buchthal and Dr. Erik Skinhj. Also among Dr. Clemmesen's associates are Dr. Else Arnsho and Dr. Lili Bernstein, two women physicians who recently visited America. Dr. Clemmesen and his associates at the Community Hospital presented a series of elaborate exhibits describing their advanced ideas on therapeutic exercise, the physiology of exercise and their extensive studies on electrical stimulation and electromyography. At the Community Hospital there is a fine training center for both physicians and technical workers, and Clemmesen and his associates are doing outstanding work in physical treatment, particularly of arthritis and poliomyelitis. Of special significance are the studies of Clemmesen and Skinhj[6] on the basis of rational electrotherapy of

6. Clemmesen, Svend, and Skinhj, Erik: Investigations on the Basis of Rational Electrotherapy of Paretic Muscles, Acta psychiat. et neurol., supplement 43, 1947, p. 1-53.

paretic muscles, the studies of Clemmesen[7] on the principles of remedial exercise, the studies of Buchthal and Clemmesen[8] on the differentiation of muscle atrophy by electromyography and the studies of Skinhj[9] on problems of acute anterior poliomyelitis and its sequelae.

Interesting work is also being done in Copenhagen by Dr. K. Jespersen, who is in charge of the department of physical medicine at the Military Hospital. Jespersen[10] has done some interesting studies on fibrositis. In Copenhagen there is a well organized center for treatment of poliomyelitis, which is under the supervision of the Danish National Foundation for Infantile Paralysis, headed by Colonel Harrel and Mr. Ragoczy. A large private home in Copenhagen has been remodeled as a center for the physical treatment of patients having poliomyelitis. The medical director of this center is Dr. Clemmesen. Well trained physical therapists are utilizing excellent equipment, including a good therapeutic pool, for the modern physical rehabilitation of patients having poliomyelitis. It was pleasing to learn from Dr. Clemmesen, as well as from Dr. Morris Fishbein and Mr. Basil O'Connor of the American National Foundation for Infantile Paralysis, who returned later on the same boat, that an international congress on poliomyelitis has been organized to be held in Copenhagen in the summer of 1951.

Gothenburg, Sweden

The trip was continued to Gothenburg, Sweden, where an afternoon was spent with Dr. Eric Severin, of Ortopediska Kliniken, who had previously spent six months in training at the Mayo Foundation. In conjunction with his orthopedic clinic, Dr. Severin had an extremely interesting vocational rehabilitation school, which was attached to the orthopedic clinic and hospital and was operated under Dr. Severin's direct medical supervision. This large vocational rehabilitation school trains seriously disabled persons in vocations which render them self supporting despite their physical handicaps. Some disabled persons were being trained as cabinet makers, others as shoemakers, others as makers of artificial limbs, others as decorative house painters and still others as machinists. Students were kept at this school for long periods until they were highly skilled. Throughout all their period of training, they remained under the direct supervision and observation of Dr. Severin and his associates. This was by far the best medically supervised vocational rehabilitation center I had ever seen.

Stockholm, Sweden

From Gothenburg a hurried overnight visit was made to Stockholm for observation particularly of the work of Dr. Ivar Palmar at the huge and extremely modern South Hospital. Dr. Palmar's orthopedic wing, with its beautiful operating rooms, was extremely modern and exceptionally well appointed. The department of physical therapy was very spacious, new and well equipped, but unfortunately it seemed to be utilized inadequately and also to lack adequate direct medical supervision. Miss Marianne Skiold, who had formerly been an exchange student physical therapist at the Mayo Foundation, conducted us through the fine school of physical education, which was extremely modern. At this school there is an excellent training pro-

7. Clemmesen, Svend: Principles of Remedial Exercise; Carriage and Working Positions, London, H. K. Lewis & Co., Ltd., 1947.
8. Buchthal, Fritz, and Clemmesen, Svend: On the Differentiation of Muscle Atrophy by Electromyography, Acta psychiat. et neurol. 16:143 (Feb.-Mar.) 1941.
9. Skinhj, Erik: Some Problems of Acute Anterior Poliomyelitis and Its Sequelae, Copenhagen, Einar Munksgaard, 1949.
10. Jespersen, K.: Fibrositis of Muscles, Ann. Rheumat. Dis. 9:66 (March) 1950.

gram for physical therapists, which is conducted in conjunction with the various local hospitals. There is no question about the excellence of the training given the technical workers at this institution.

Edinburgh, Scotland

In Edinburgh a visit was made to an orthopedic friend, Mr. George Pollock, who is particularly interested in the orthopedic care and physical rehabilitation of patients having poliomyelitis or cerebral palsy. He is orthopedic consultant to the very fine and very modern Princess Margaret Rose Hospital for the care of crippled children. This hospital has an excellent therapeutic pool and a well supervised program of physical therapy.

About two years ago, George Pollock came to America to study methods for the physical rehabilitation of children with cerebral palsy. Thereafter he returned to Edinburgh to establish an excellent cerebral palsy rehabilitation center at Westerlea. This center, which is located in a remodeled, beautiful old private home, is conducted in an outstanding manner by Mrs. Alexander Frazer, the wife of a physician, who has had extensive training in the rehabilitation of patients having cerebral palsy. This center is staffed with a well trained group of physical therapists, occupational therapists and speech therapists, who conduct a rehabilitation program of the first order under the direction of Mr. Pollock and his associates.

The stay in Edinburgh also permitted a visit with Mr. Pollock and another orthopedic surgeon, Mr. Anderson, to the ancient Royal Infirmary. Here there was a large department of physical therapy through which an enormous number of patients were processed. Group therapy was in vogue and large classes of patients were being treated in various mass exercise programs. There was one large class for correction of deformities of the foot; another large class was taking back exercises, another was being given postural training, and still another was being given coordination exercises. Here, as in the South Hospital in Stockholm, there was a disappointing lack of direct medical supervision, and consequently the service in physical medicine suffered accordingly.

London, England

The fine programs in physical medicine and rehabilitation in many of the London hospitals were quite impressive. At the King's College Hospital, Dr. Frank Cooksey and his assistant, Dr. Basil Brock, direct an excellent department of physical medicine, where a group of well trained physical therapists and occupational therapists were working under their close direct medical supervision. The activities in the department of occupational therapy went beyond mere diversional and functional occupational therapy and included prevocational training under a group of enthusiastic and cooperative technical workers.

Dr. Cooksey has prepared a statement on consultant services in physical medicine for the National Health Service which reads:[11]

> Physical medicine comprises within its field the work of medical practitioners specializing in the achievement and maintenance of health through physical education; the restoration to health and efficiency, after sickness or injury, through medical rehabilitation the conservation and maintenance of function in degenerative and disabling conditions; the development, coordination and clinical supervision of physiotherapy, remedial gymnastics, occupational therapy and associated social services.

11. Ministry of Health, National Health Service: The Development of Consultant Service, London, His Majesty's Stationery Office, 1950.

Of especial interest during the visit to King's College Hospital was a vocational placement conference. This conference was conducted by Dr. Cooksey as head of the department of physical medicine and was attended by two of his residents, the almoner (social service worker), the chief occupational therapist and two of the government's disablement rehabilitation officers from the Ministry of Labour and National Service. Several rather difficult placement problems were discussed. Each person attending the conference had before him a typed sheet giving a brief history and outlining the problems in vocational placement of the disabled person who was to be presented. Then the patient was brought in, at which time a general discussion ensued in which the patient participated. Finally a decision was reached with regard to the proper vocational rehabilitation of that particular patient. The discussion was lively and forthright. Suitable solutions were usually found within a short time.

Under the Disabled Persons (Employment) Act of 1944,[12] courses of vocational training and industrial rehabilitation are provided for handicapped persons to enable them to obtain employment. Some of these patients were assigned to such training programs, while others were returned directly to suitable positions.

At St. Thomas Hospital, there is a well organized department of physical medicine, under the direction of Dr. Philippe Bauwens. It was interesting to note that at St. Thomas Hospital (as had also been the case at King's College Hospital), there was a well equipped laboratory of biophysics in the department of physical medicine. It is evident that modern developments in physical medicine require extremely close collaboration between the biophysicist and the physiatrist. It was extremely gratifying to see such close collaboration in these two London hospitals.

Dr. Bauwens is himself an electrical engineer as well as a physician. He has organized a fine program in electromyography. His training as an engineer has enabled him to do advanced work in the development of new types of electromyographic equipment. It was a privilege while in London to discuss an interesting paper on electromyography which Dr. Bauwens read before the Institution of Electrical Engineers. Dr. Bauwens pointed out:

> The musculature of man reflects the state of his nervous system and lesions of this system and of the muscle proper modify the behavior and the reactions of the functional and structural elements which ultimately compose the anatomical muscle. Affections of the brain, spinal cord, nerve trunks and muscles have their particular characteristics and require for their recognition observations as regards waveform, duration, amplitude, complexity, frequency of repetition, periodicity, synchronism, etc.

Finally he described the excellent electromyographic apparatus which he had devised.[13]

Dr. Bauwens has an excellent training program at St. Thomas Hospital and is aided by a fine biophysicist, Mr. Peter Stiles, and a very capable registrar, Dr. A. T. Richardson.

At the London Hospital, there is a large separate building set aside for the department of physical medicine, which is under the very capable direction of Dr. William Tegner and his residents, Drs. Scott, Buckler and Birkbeck. Dr. Tegner also has a well organized school for training physical

12. The Disabled Persons (Employment) Act, 1944, Ministry of Labour and National Service, London, 1945.
13. Bauwens, P.: The Analysis of Action Potentials in Electromyography, abstract of a lecture read before the Institution of Electrical Engineers, London, May 11, 1950.

therapists in addition to an excellent residency program for training of young physicians.

As is so frequently the case in Europe, Dr. Tegner combines physical medicine and rheumatology. He conducts in conjunction with his department of physical medicine his own ward service. In all the London hospitals there is a tendency to group patients for class work in therapeutic exercises, but in the London hospitals these classes are carefully supervised from a medical standpoint. The class exercises are supplemented when necessary by specific individual exercises for selected patients. The morale of the patients seemed excellent. It was apparent that there were certain psychologic advantages in such group exercises, which make it evident that American physicians should pay more attention to such classes for groups of patients.

At the London Hospital, the condition of all patients is carefully followed by the staff physicians and prescriptions for physical treatment are appropriately modified as the patients continue under treatment.

At the University College Hospital, there was another fine department of physical medicine, under the direction of Dr. Hugh Burt, the president of the section on physical medicine of the Royal Society of Medicine. Dr. Burt has with him as residents Drs. Fell, Howenden, Steward and Fletcher. This excellent staff demonstrated many well studied patients for whom fine physical therapeutic programs had been developed.

In most London hospitals there is a tendency to use sling suspension as an aid to therapeutic exercise. They do not usually have Hubbard tanks or therapeutic pools as we often do in America. Therefore, in lieu of underwater exercise, they frequently substitute the sling suspension. Instead of employing a Bradford frame as we do, most of the London hospitals employ a Guthrie-Smith frame, which consists of a heavy overhead screen made of strong wire netting from which slings can readily be hung in exactly the right spot with only a minimal amount of effort.

A splendid program for the rehabilitation of the aged is conducted by Lord Amulree and Dr. Hugh Burt at St. Pancras Hospital. Lord Amulree, with his residents, Dr. Crockett and Dr. Axton-Smith, in collaboration with Dr. Burt and his staff of physical therapists, makes the program in geriatric rehabilitation outstanding. The large wards are brightly painted; colorful pictures are hung on the walls, and flowers decorate the tables around the wards. The aged and disabled patients are kept on a full program throughout the day; consequently, morale appeared to be exceptionally high. Lord Amulree's buoyant spirits seemed to permeate the entire institution, and it was reported that 80 per cent of these disabled geriatric patients were returned to their homes capable of adequate self-care and frequently capable of reemployment.

In London, good equipment, ample facilities, well trained technical personnel and close medical supervision were the rule. The high quality of the physical medicine practiced in the London hospitals gave one a very favorable impression.

It is a pleasure to report that on May 10, 1950, the International Federation of Physical Medicine was established in London under the auspices of the British Association of Physical Medicine. National organizations in Switzerland, Holland, Denmark, Sweden, the United States of America, Australia and Great Britain have already agreed to participate in this international federation. Svend Clemmesen, of Denmark, was named the interim vice-president; Philippe Bauwens of England was named the honorary sec-

retary, and I was named the interim president. It was agreed that an international congress on physical medicine should be held in London in July, 1952.

Dublin, Ireland

The last European city to be visited was Dublin, which had, in the past, only a limited amount of physical medicine in its hospitals. However, the physicians of this city are keenly aware of the need for development of an adequate program of physical medicine. They have already sent a fellow, Dr. Walter Treanor, to this country for training in physical medicine under a grant from the Irish Medical Research Council. At St. Vincent's Hospital, they are planning to build an adequate department of physical medicine in a new hospital building which they are about to construct. Furthermore, their research council is sending several other physicians to America to study various phases of physical medicine and rehabilitation of the disabled.

Recently there has been an increasing number of cases of poliomyelitis in Ireland. Strenuous efforts are being made to prepare for the expected epidemic of poliomyelitis, and Dr. Chris McSweeney, the head of their Fever Hospital, will soon come to America to study our methods of treatment and rehabilitation for poliomyelitis.

General Impressions

Following the recent devastating war, European medicine is gradually regaining its stride. European physicians, despite handicaps of governmental regimentation and shortages of finances, equipment and modern literature, are forging ahead. Physical medicine and rehabilitation are growing apace, and particularly outstanding work in these fields is being done in Copenhagen and in London. Prevocational training is accomplished more successfully in many European hospitals than is the case in many American hospitals. Vocational training of the seriously disabled is highly developed in Europe, especially in Sweden and in England. The vocational placement conferences conducted in the London hospitals indicated a greater advancement in the formation of organized programs for the vocational placement of seriously disabled persons than exists in most American communities.

There is great need for close collaboration between European physicians and American physicians who are interested in physical medicine and rehabilitation in order that there may be a free exchange of ideas and further advancement of this important phase of medical practice. It is to be hoped that as many American physicians as possible can participate in the forthcoming international congress on physical medicine in order to promote mutual understanding, continued growth and proper development in this field.

MEASUREMENT OF WHIRLPOOL TEMPERATURE, PRESSURE AND TURBULENCE *

F. A. HELLEBRANDT, M.D.
SARA JANE HOUTZ, M.S.
and
ROBERT N. EUBANK

RICHMOND, VA.

Introduction

History of the Whirlpool Bath. — The *eau courante* bath seems to have had its origin in France during the First World War. It was employed extensively for the treatment of amputation stumps, gunshot wounds, stiff joints, contractures and painful scars. The hot and cold water supply to the extremity bath entered a mixing chamber and was then ejected from a number of jets. Describing the first *eau courante* baths installed in England, which were copies of the French model, Nunneley[1] wrote as follows: "After rushing round the bath, the water flows out through an opening near the top. The whirlpool is thus produced by a constant stream of rapidly flowing water." This new therapeutic device was investigated by Dr. Fortescue Fox on behalf of a committee of the Balneological Section of the Royal Society of Medicine, which then recommended its adoption to the British military authorities. Modifications in design soon followed. To conserve water, whirling was produced by an electrically driven turbine placed under a grating at the bottom of the bath. Turbulence was increased by forcing compressed air through the water. Since the turbine could be cleansed only with difficulty, the treatment of open lesions in the continuous flow type of equipment persisted.

The French *eau courante* whirlpool bath was used also in the reconstruction sections of the United States service hospitals during the First World War.[2] The arm bath was shaped like a small baby's tub. The leg whirlpool was cylindrical, 12 to 13 inches in diameter, and set at an angle of approximately 30 degrees from the vertical. Sampson describes these and the "improved" models manufactured in the United States shortly thereafter. A change in shape and increase in the size of the bath without compensatory augmentation in the force available to agitate the greatly enlarged volume of water, and reduction of the number of nozzles from three to two, led to the introduction of an aerator designed by Captain F. A. Bardwell at Walter Reed Hospital. This consisted of an air inlet which was connected to the water inlet through a plumber's T-joint placed slightly behind the tip of a reducing nozzle one-third the diameter of the feed pipe.[3] The stream of water issuing from the reducing nozzle was allowed to spread and mix with the air before being ejected into the bath. The device was considered by Sampson as inoperable without the extension of the nozzle. About three times the whirl was obtained by this modification in the design of the *eau courante*

* From the Division of Clinical Research, Baruch Center of Physical Medicine and Rehabilitation, Medical College of Virginia.

1. Nunneley, F. P.: The Whirlpool Bath, Brit. M. J. 2:721 (Nov. 25) 1916.
2. Sampson, C. M.: Physiotherapy Technic: A Manual of Applied Physics, St. Louis, C. V. Mosby Company, 1923.
3. Baruch, Simon: An Epitome of Hydrotherapy for Physicians, Architects and Nurses, Philadelphia, W. B. Saunders Company, 1920.

bath without change in the head of pressure, and the amount of water required was reduced to less than one-third. In 1939, Boynton[4] introduced two fixed inlets, one at 4 inches and the other at 18 inches above the bottom of a homemade whirlpool bath, 27½ inches deep. Each inlet was equipped with a McDaniel suction tee and an air vent. In the meantime, the extremity bath depending upon a turbine for the agitation of a constant volume of water had been redesigned and approved by the Council on Physical Therapy of the American Medical Association.[5] Another modification in design was made during the Second World War. This was approved also by the Council.[6] It appears to combine the main features of the original *eau courante* bath with many of the refinements of later models. In addition, the literature of the last 25 years contains descriptions of a number of interesting and seemingly practical improvisations, aimed at reducing the cost of whirlpool installations, increasing their mobility or improving the efficiency of their operation.[7]

Early Technic of Application. — The original method of administering the whirlpool bath differs considerably from that now in vogue. The treatment commenced at a neutral temperature. The temperature of the water was then gradually increased to the limit of the patient's tolerance, allowing the bath to continue for 15 to 20 minutes thereafter. "The hotter the bath, the better the results,"[8] seemed to have been a generally accepted therapeutic axiom in the 1920's. After one or two treatments, tolerance was said to have been acquired for the 110 to 120 F. range, or even higher, though this was rare. If anesthetic areas were present, the temperature was not raised beyond 118 F. As late as 1932 temperatures in the 110 to 115 F. range were still advocated.[9] Current practices vary (100 to 105 F.,[10] 105 to 110 F.,[11] 110 to 115 F.).[12] The technic of increasing the temperature of the bath systematically during the progress of the treatment seems to have fallen into disuse. The consequence of these changes in procedure has never been discussed and is open to speculation.

Being a simple device, the whirlpool is probably often used haphazardly. Sometimes it is resorted to as a convenient method for the application of moist heat. Although an impressive list of effects is purported to be produced by the whirlpool bath,[13] presumably in virtue of the agitation of the water, very little has been done in the way of subjecting these beliefs to quantitative study. This is astonishing when one takes into consideration the initial, maintenance and operational costs of the type of equipment under discussion and the frequency with which it is considered one of the minimal essential tools of a modern physical medicine and rehabilitation department. To our knowledge, the dosage of that which distinguishes the whirlpool from the stationary extremity bath has never been rendered measurable. Indeed,

4. Boynton, B. L.: Home-Made Whirlpool Bath Suitable for Arms and Legs, Arch. Phys. Therapy **19**:279 (May) 1938.
5. Report of the Council on Physical Therapy, J. A. M. A. **111**:935 (Sept. 3) 1938.
6. Report of the Council on Physical Therapy, J. A. M. A. **123**:701 (Nov. 13) 1943.
7. Lanenecker, H. L.: Useful Apparatus in Physiotherapy, California State J. Med. **19**:339 (Aug.) 1921. Titus, Norman E.: A Portable Whirlpool Bath, Phys. Therapeut. **44**:589 (Nov.) 1926. Pope, C.: A New Whirlpool Bath for Institutions, ibid. **47**:80 (Feb.) 1929. Emerson, R. S.: A Portable Whirlpool Bath, Arch. Phys. Therapy **20**:671 (Nov.) 1939. Rudin, L. N.: An Improvised Whirlpool, Bull. U. S. Army M. Dept. **6**:87 (July) 1946.
8. Pope, Curran: The Whirlpool Bath, Mineral Waters of the United States and American Spas, Philadelphia, Lea & Febiger, 1927.
9. Nylin, J. B.: Hydrotherapy, Arch. Phys. Therapy **13**:261 (May) 1932.
10. Bierman, William: Physical Medicine in General Practice, 2 ed., Paul B. Hoeber, Inc., New York, 1947.
11. Krusen, Frank H.: Physical Medicine, The Employment of Physical Agents for Diagnosis and Therapy, Philadelphia, W. B. Saunders Company, 1941.
12. Kovács, Richard: Electrotherapy and Light Therapy with the Essentials of Hydrotherapy and Mechanotherapy, Lea & Febiger, 4th ed., Philadelphia, 1942.
13. Hinsdale, Guy: Survey of the Actual Value of Hydrotherapy, J. A. M. A. **89**:502 (Aug. 13) 1927. Pope, Curran: The Physiological Action and Therapeutic Value of General and Local Whirlpool Baths, Arch. Phys. Therapy **10**:198 (Nov.) 1929.

the degree to which pressure and turbulence can be varied by devices in common use has yet to be observed systematically.

Purpose of the Investigation. — The ultimate objective of this study is to determine the physiological effects of the whirlpool bath so that the rationale of its current technic of application may be evaluated. Are the results achieved worth the cost of attaining them? In attacking this problem, it has been our major premise that the physiological effects of the device under study cannot be estimated reliably unless the operator can control and measure the variables thought to be the cause of the phenomena under observation. Thus, the measurement of whirlpool temperature, turbulence and pressure, the subject of this paper, is the first step in the solution of a practical problem which has economic as well as medical implications.

Methods

Preliminary Observations. — Two variables are concerned in whirlpool therapy, the temperature of the water and its agitation. Temperature measurement offers no difficulties. To reduce observational errors and render the data maximally objective, a Micromax Recorder was used. This converts heat into electrical units by the use of a thermocouple immersed in the liquid. The thermocouple leads connect to a recording meter which indicates every change in temperature on a slowly moving disk of calibrated paper.

Initial pressure observations were made at the University of Wisconsin during the summer of 1945, with equipment borrowed from the Hydraulic Department of the School of Engineering. Subsequently, a four blade differential midget current meter was obtained, equipped with an electrical contacting device, wired to headphones (fig. 1). Each revolution of the paddle is accompanied with an audible click. To obtain objectivity a Veeder-Root magnetic counter was substituted for the headphones. Velocity of flow in one direction, such as the stream ejected from the nozzle of a turbine type whirlpool, could be measured satisfactorily. However, observations made outside the main stream were distorted by turbulent fluctuations in pressure actuated by the multi-directional reflections of the initial force. Thus the midget current meter could not be used effectively in portions of the bath where the water was moving simultaneously in several different directions.

The second series of preliminary pressure observations were made with a Cenco Pitot tube (fig. 2). In principle this device is a static pressure tube with a velocity pressure arm. Its operation depends on Toricelli's law, which states that the velocity of a liquid in feet per second is equal to the square root of twice the acceleration of gravity times the head in feet. The component parts of the Pitot tube were attached by pressure tubing to the arms of a bromoform manometer. Because it was difficult to read the two columns of the manometer simultaneously, the static pressure tube was connected to a Marey tambour and brought to atmospheric pressure. Thus, as used, turbulence could now be recorded graphically but not velocity. Because the size of the commercially available instrument was not conducive to convenient use in the average whirlpool, a modified Pitot tube was constructed; but this too was discarded because its directional properties were too limited.

Development of Single Plane Cumulative Paddles Designed to Record Pressure and Turbulence Simultaneously. — The instrument used for the major results herein reported was designed and constructed by one of us (R. N. E.). The assembly is illustrated schematically in figure 3. Two 4 blade paddles were built to accumulate the pressure of water flow in all directions in the cardinal orientation planes, horizontal and vertical respectively. Each paddle blade was ½ square inch in area. Thus there was 2 square inches of blade area per paddle; this was arranged so that any single plane movement within the area of the paddle might be summated. The accumulated forces were then transmitted as a torque to a Rochelle salt crystal cartridge located above water level. The crystal converts torque into voltage in proportion to displacement of its free end as related to its fixed end. An aluminum housing constructed from circular tubing ½ inch in outer diameter was used to prevent turbulence from influencing crystal output at points other than the paddle. This device records velocity and fluctuation simultaneously. The output from the crystal was amplified through a four stage electronic amplifier of 10 watts output or more. It was fed into the amplifier by shielded cable to prevent the pickup of extraneous interference. The output of 10 watts was rectified

by a bridge type selenium disk full wave rectifier. This is sufficient to operate a recording direct current voltmeter of 12 volt full scale. A voltage regulator was introduced to eliminate line voltage fluctuations from appearing on the graph, thus per-

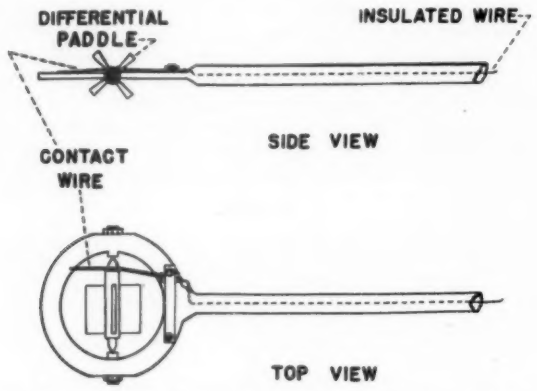


Fig. 1. — Sketch of the 4-blade differential midget current meter, useful for measuring velocity of flow in one direction.

mitting the establishment of a constant base line. The equipment is sufficiently rugged to withstand the degrees of pressure and turbulence developed by all types of commercially available whirlpools. It is portable, easily assembled and readily adjustable so that the paddle may be made to measure pressure and turbulence in any part of the whirlpool.

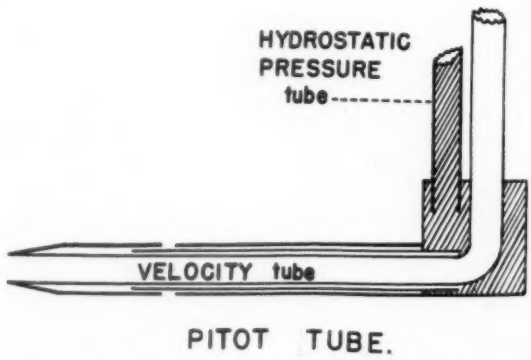


Fig. 2. — Cross- sectional diagram illustrating the construction of a Pitot tube. As modified (see text), the device recorded turbulence graphically.

Mapping Whirlpool Turbulence and Pressure. — The procedure was standardized in the following manner: Horizontal and vertical components of turbulence and pressure were studied independently. Observations were made at successive levels at selected points 1 inch from the wall of the bath, midway between the periphery and the center and in the midline. The points selected for sampling were systematically distributed to include all parts of the pool. If the device producing agitation was adjustable as to

height and direction, the full range of variation was studied. After ascertaining that observations were substantially equal in symmetrically disposed points when the agitator was placed in a midline, data were collected only on one side. Preliminary observations

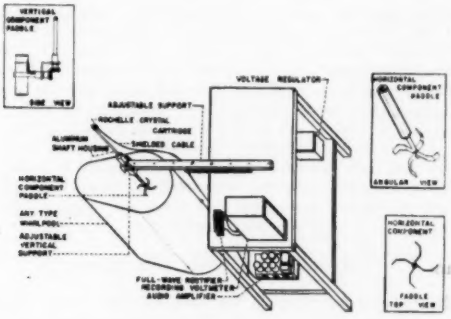


Fig. 3. — Three dimensional diagrammatic sketch of the single plane cumulative paddles designed to record whirlpool pressure and turbulence simultaneously.

demonstrated that temperature variations in the clinical range had a minimal influence on the indicating device. Hence, most observations were made with use of tap water at approximately room temperature. Since the volume of the water agitated influences both pressure and turbulence, this was kept constant for any given bath and approximated that used clinically. The reliability of the recording device was checked repeatedly during any given experiment by making base line observations under standard operating conditions. It required 20 to 30 minutes to warm up the electrical equipment and get a constant base line. The general pattern of pressure and fluctuation was highly repeatable and was not influenced by extending the duration of observation to periods equivalent to average treatment time.

Measurement of Subsidiary Variables Affecting the Continuous Flow Type of Whirlpool Bath. — The three main varieties of whirlpool in common use today were available for study. These are the continuous flow type of whirlpool, the nozzle type turbine agitator and the rotary turbine. Only the first of these introduces incidental variables necessitating evaluation before the temperature, pressure and turbulence of the water in the whirlpool bath can be studied.

1. Analysis of the Efficiency of Mixing Valves: The thermostatic mixing valves used in most hydrotherapy departments have a functional efficiency related to the pressure in the hot and cold supply lines feeding these devices. When the pressures are approximately equal, the mixing valve operates reliably.[14] This condition can be achieved most simply by providing independent storage tanks for the hot and cold water supply to the hydrotherapy department. If the main hot water line from the power plant supplies a variable number of different buildings and that supplying the hydrotherapy department is a feeder line stemming from a branch, the functional efficiency of hydrotherapy equipment may be grossly affected. This is particularly true if the department is in close proximity to installations, such as a laundry, which make exceptional drains on the hot water supply during certain hours of the day. In general, the pressure of the cold water line fluctuates less markedly than the hot in such installations, though it is affected to a certain degree by diurnal variations in the pressure of the water in the city mains supplying the institution. In hot and dry weather, this variation may be considerable, especially in the daytime. Temperature variations in the supply lines are also important. In Richmond, cold tap water ranges from approximately 45 F. in the winter time to approximately 70 F. during the summer months. The temperature of the hot water leaving the power plant ranges from 140 to 180 F.

2. Analysis of Details of Installation: With the assistance of the mechanical engineer of the Medical College of Virginia, Mr. Andrew J. Bottoms, a critical analysis was

14. Portes: Automatic Regulation of the Temperature of Water: Its Application for the Medical Shower, J. méd. de Bordeaux 98:561 (Aug. 10) 1923.

made of the water supply to a single piece of hydrotherapy equipment. This was a lower extremity continuous flow whirlpool of standard commercial design. The variables selected for study were the following: the pressure in the main cold and hot water supply lines to the building, the pressure in the hot and cold feed lines supplying the whirlpool mixing valve, the pressure of the mixed water leaving the thermostatic valve, the nozzle pressure, the mixed water pressure and the temperature of the water in the whirlpool bath. The whirlpool was turned on and adjusted carefully to full standard operating conditions. It was allowed to run for 24 consecutive hours without interruption. Observations were made at all points every 15 minutes. The sequence at which the meters were read was held constant. The indicating devices used to measure feed line and whirlpool pressures were mounted on a single panel to facilitate reading. Because these observations could not always be made simultaneously with readings of the pressure in the hot and cold supply lines to the building during the night, they were separated by the time required to walk to the point at which these gauges are installed. This was approximately two minutes and was held reasonably constant. Water temperature in the whirlpool bath was measured continuously with a Micromax Recorder geared to make 1 disk revolution per hour.

Results and Their Discussion

The conditions under which the continuous flow whirlpool bath was operated are illustrated in figure 4. The cold water pressure in the main

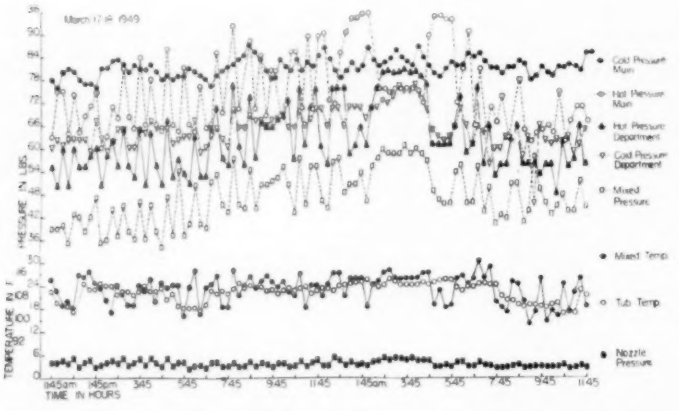


Fig. 4. — Twenty-four hour observations of feedline temperature and pressure variations and their influence on the operational efficiency of a continuous flow type whirlpool of standard commercial design.

supply line averaged 80.82 pounds per square inch. Maximum variation over a 24 hour period ranged from 76 to 87 pounds per square inch (±6.75 per cent). The nocturnal increase in pressure was less than had been anticipated. The pressure in the main hot water supply line averaged 74.73 pounds per square inch and ranged from 60 to 95 pounds per square inch (±22.58 per cent). As expected, maximal pressure variations increased in the departmental feed lines. They were ±25.62 per cent and ±28.00 per cent for the cold and hot water respectively. The fall in pressure between the main supply line and the departmental branch line at the point of entrance to the mixing valve averaged 20.69 per cent on the cold side and 18.61 per cent on the hot side. The pressure just beyond the mixing valve was reduced by an additional 20.53 per cent. The lowest value observed was 34 pounds per square

inch and the highest was 60 pounds per square inch (±27.66 per cent). The biggest pressure swing noted in any 30 minute period during the hours when hydrotherapy equipment is ordinarily in use was from 40 to 57 pounds per square inch. At the nozzle the mean pressure was slightly less than 5 per cent of the main line value. It fluctuated from a low of 2 to a high of 5 pounds per square inch and averaged 3.61 pounds per square inch.

Fluctuations in supply line pressure obviously influence whirlpool pressure and turbulence. These cannot be evaluated until more is known about the physiological effects they produce. However, their influence on the reliability with which the mixing valve operates can be estimated. At the onset of the 24 hour period of continuous observation, the mixing valve was set to provide a temperature of 110 F. at a fixed point in the bath in the region occupied by a limb as immersed for routine clinical use of the equipment. During the period of observation the mixed water temperature ranged from a low of 98 F. to a high of 122 F. The greatest change observed during any half hour in the daytime was from 98 to 114 F. This fluctuation occurred on the morning of a day when the laundry was in full operation. During this time tub temperatures were consistently below the initial value for which the whirlpool bath had been adjusted.

In toto, 193 instantaneous bath temperature observations were made during the 24 hours. The mean temperature was 108.85 F., which is only slightly below the initial value for which the mixing valve had been set. The lowest reading recorded was 100 F., and the highest, 116 F. This covers the full temperature range recommended by the sum of the three standard textbooks previously referred to and may be assumed to be within the limits of safety for the average person with a normal peripheral circulation. In toto, 29.02 per cent of the readings fell between 105 F. and 109 F., and 45.08 per cent fell between 111 F. and 115 F. The latter were observed mostly during the night, when hydrotherapy equipment would not ordinarily be in use. Variations of from 8 to 10 degrees occurred in 15 minutes only twice in the 24 hours. The significance of such fluctuation in temperature varies with the duration of the change, the pressure of the water at that time, the capacity of the bath and whether or not the water is ejected in a concentrated stream from a nozzle in close proximity to the part being treated. Thus it is not necessarily a hazard. It is of some interest to note that only 9.33 per cent, or 18, of the 193 instantaneous temperature observations made within the whirlpool bath were at the level for which the mixing valve had been adjusted. All the data graphed in figure 4 are instantaneous observations made at predetermined intervals of time and hence do not necessarily reflect the full range of transitory oscillations. Although a high degree of precision in temperature control could not be attained readily and although pressure adjustment was beyond regulation, this does not mean that the continuous flow type of whirlpool is so unreliable that average clinical needs cannot be met. The results presented pertain to a particular installation. Operational conditions may be either better or worse elsewhere.

The major results to be presented are concerned with pressure and turbulence variations within the whirlpool bath per se. Many preliminary observations were made with the midget current meter and the Pitot tube in an effort to delimit the problems to be investigated. In toto, 1963 exploratory observations of pressure and turbulence were made in 48 different locations on 5 whirlpool baths using the Eubank paddles. No systematic observations were made of temperature after it had been determined that this variable did not affect the pressure device and that the Micromax would

provide a continuous record, moving at a speed sufficient to permit detailed analysis of temperature changes during periods of time equivalent to those used clinically. Fluctuations in pressure per unit time were integrated planimetrically. Since the recording device was operated by compression of a spring, the sine of the angle was used to determine the amount of turbulence.

Rotary Agitator Type Whirlpool. — Under normal operating conditions with the air valve open, pressure increased with depth uniformly throughout the pool and then fell off slightly. It reached its highest level 9 to 10 inches below the water surface in a bath 14 inches deep. The drop in pressure at the bottom of the tank appears to be the result of the counterforce exerted by suction. In this type of whirlpool the water is ejected rotationally from multiple outlets located approximately midway between the center and peripheral wall of a cylindrical tank. The main stream is forced upward; simultaneously water is returned to the agitator at the periphery of the bottom of the tank by a suction force which affects approximately the lowest 25 per cent of the fluid volume.

When the air intake valve was closed, pressure fell significantly. It was markedly reduced in the central and intermediate positions at all depths. It was considerably higher at the periphery of the bath but never exceeded 60 to 65 per cent of the lowest pressure attained during aeration. The rotary agitator creates a whirling centrifugal force. The water spirals to the surface of the tank against less and less hydrostatic pressure. However, the upward thrust appears to be dissipated in the lower half of the pool owing to the large volume of water being moved. Hence surface pressure is low. When the return inlets were blocked in part, the vertical pressure in a contiguous section of the tank increased approximately 25 per cent.

When air and water are released simultaneously, the bubbles created expand as the upper levels of the pool are approached and hydrostatic pressure is reduced. Thus turbulence was markedly increased at the surface of the whirlpool bath. Below a depth of 7 inches, turbulence dropped precipitiously. Turbulence and pressure bear a roughly inverse relationship, one to the other. At a depth of 5 to 7 inches, the pressure and turbulence curves cross; at all points about this level, pressure is low and turbulence is high; below this level, the relationship is reversed (fig 5).

The length of time necessary to set the volume of water in this tank in motion varied from 10 to 20 seconds, depending upon whether or not the equipment had been in use. A reduction in the volume of water producing as little change in depth as 1 inch markedly modified the pressure and turbulence pattern. A wholly different pressure and turbulence pattern could be produced at a position normally occupied by the extremity during treatment through the simple expedient of reducing the volume of water in the bath. Thus, the observations herein reported indicate that the rotary agitator type whirlpool bath provides a heterogeneous treatment medium, sufficiently different at various levels and volumes of water to yield different degrees of hydrokinetic stimulation. Whether or not these produce measurable variations in physiological effect remains to be determined. They suggest that patient positioning may be more important in grading whirlpool "dosage" than usually considered. Equipment is now available which should permit a decision as to whether or not agitation per se is of therapeutic value.

Nozzle Type Turbine Whirlpool. — Observations were made on lower and upper extremity baths of this variety which are oval in shape. It was impossible to eliminate completely the entrance of air, even when the control

valve was fully closed. In general, mean pressures were higher with the air vent fully open. They were now uniformly high throughout the pool with the exception of a localized area in the immediate neighborhood of the stream when the nozzle was in its lowest position. The difference in pressure between the bottom and top of the pool was relatively small, being slightly lower at the surface. The counterforce of suction also had some effect on pressures at the bottom of the pool. Pressure reached its peak in a 6 inch band slightly above the center of the bath. In all positions at the level of the nozzle, the ejection force was primarily unidirectional and constant. Incidental experiments demonstrated that when a steady force is applied to the paddle, the crystal responds instantaneously and then ceases to indicate. Thus the paddle and crystal are useful especially for the cumulation of variable multidirectional forces. Because operational conditions were stabilized before the recording device was turned on, instantaneous pressure changes were not obtained. By modifying the procedure, it may therefore be possible to also measure pressure in the direct stream, increasing the usefulness of the equipment. All evidence indicates that the localized drop in pressure under discussion is an instrumental artefact. Simple raising of the level of the nozzle nullifies this effect because reflected currents now influence the paddle.

Turbulence was high at the surface of the pool in all positions and decreased with depth. The degree and rate of fall varied with the location of the observation point, the level and direction of the nozzle.

As far as could be determined, there is no difference in the magnitude of the agitating force applied to the greatly different volumes of water contained in the upper and lower extremity whirlpool baths of the type under discussion. When the air control valve of the upper extremity whirlpool was fully open and the nozzle was in its lowest position, the ejection force was so great that water was thrown out of the bath, despite the fact that its nonoperating level was 5 inches below the top of the tank. It was impossible to make reliable observations because vibrations of the whirlpool transmitted to the instrument table could not be eliminated.

Continuous Flow Type of Whirlpool. — As already discussed, pressure within the continuous flow whirlpool is dependent upon the pressure in the hot and cold water supply lines to the equipment. The double jet nozzle was placed in midposition at the bottom of the pool, which is rectangular with rounded corners. When the air vent was closed, pressure was negligible in all areas outside the direct stream issuing from the T-shaped jets. High pressures were obtained peripherally at all depths when air was admitted. In all other regions pressures were low at the surface of the bath and tended to increase with depth. However, they never reached the height attained in the proximity of the direct stream. The horizontal pressure component exceeded, in general, the vertical component. Pressure conditions in the supply lines were so variable, that the continuous flow whirlpool could not be used for reliability studies.

Summary

The history of the application of hydrotherapy by the agitation of water in an extremity bath is reviewed, and factors affecting the "dosage" of this modality are discussed. Methods of measuring whirlpool temperature, pressure and turbulence are presented. Equipment designed to permit quantitative measurement of these variables is described.

The evidence available from extensive exploratory observations suggests that the agitational patterns produced in whirlpools of various types differ significantly and that those in a given piece of equipment are far from uniform at all depths and in all positions. Their physiological effects await further study.

Mildred F. Heap, M.S., R.P.T., assisted in the conduct of the preliminary observations, especially those utilizing the Pitot tube. Mr. Andrew J. Bottoms designed the instrument panel used to measure the conditions under which a continuous flow whirlpool operates and made all special plumbing connections. Prof. L. E. A. Kelso, of the School of Engineering, University of Wisconsin, gave invaluable advice in the planning of this study.

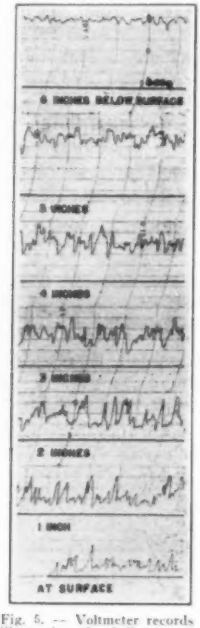


Fig. 5. — Voltmeter records illustrating the influence of the depth at which observations are made on the relationship of turbulence and pressure.

NEW HYDRAULIC EXERCISE TABLE

ARTHUR L. WATKINS, M.D.

Assistant Clinical Professor of Medicine, Harvard Medical School,

Chief of Physical Medicine, Massachusetts General Hospital

BOSTON

For 18 months we have had an opportunity to use a new hydraulic exercise table as an adjunct to other physical therapeutic equipment in the Department of Physical Medicine of the Massachusetts General Hospital. This clinical trial seemed successful enough to warrant a description of the table and a summary of the technic employed and the indications for its use.

Construction

The table is made of wood with three movable sections: the back rest and two leg boards. In the elevated position the maximum angle of the head board is 45 degrees and the foot boards 70 degrees. These boards may be lowered 25 degrees below the horizontal. Motion of these boards is controlled by a double-action hydraulic pump and three two-way high pressure oil valves. The pump is operated by means of a long arm lever on the right side of the table, and pressure released by a shorter arm on the same side. Adjustable straps are attached to both the back and leg pieces. The table is 6 feet long and 2 feet high and weighs approximately 270 pounds.[1]

Technic of Use

1. *Positioning of the Patient.* — The patient is placed on the table while it is in the horizontal position and made comfortable with pillows and then securely held in place by the movable straps.

a. Prone Lying: With the patient lying face down, the structure in the low back may be stretched by lowering both head and foot boards, thus reducing lumbar lordosis (fig. 1). The flexors of the spinal column can be stretched by raising both head and foot boards, increasing lordosis.

b. Supine Lying: With the patient lying face up, the hamstrings may be stretched by elevating one or both leg boards. Additional stretch can be obtained by elevating the back board simultaneously (fig. 2). To stretch hip flexion contractures, the head board may be lowered slightly and both leg boards elevated to maximum degree. The affected leg board is then lowered as tolerated while the pelvis remains fixed by the position of the opposite leg.

2. *Operation of Table.* — Raising of the back and two leg boards is accomplished by pumping the tall handle on the right side of the table back and forth while at the same time the appropriate valve knob on the left side is pushed in. There is one valve for each of the three movable boards, and only one movement at a time is possible. To lower any of the three boards, the valve knob is again pressed while the short release valve handle on the right is pushed forward. The extent of excursion of this handle regulates the escape of the liquid and hence the speed of lowering of the board. The hydraulic action makes the movement very smooth and gradual. The patient himself can operate the controls and increase the stretch according to tolerance as muscle spasm is reduced and lengthening obtained. The patient operation of the controls removes the element of fear which appears to aid muscle relaxation. Heat may be applied during the treatment if desired, such as by the use of a radiant heat lamp or by diathermy. The length of

1. Manufactured by Allen and Pace, 16 Congress Street, Portsmouth, N. H.

time of each treatment is individually determined according to the patient's response. In general, 15 to 45 minutes has most commonly been used. When active exercises are indicated, they may be performed on the table in the neutral position.

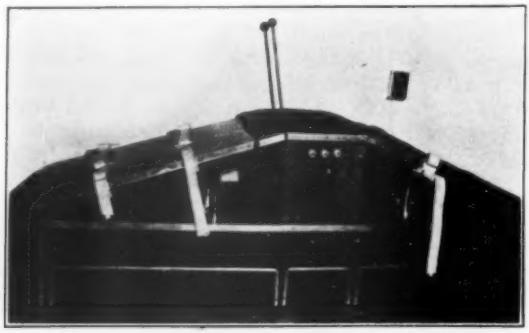


Fig. 1. — Hydraulic table with head and leg boards depressed.

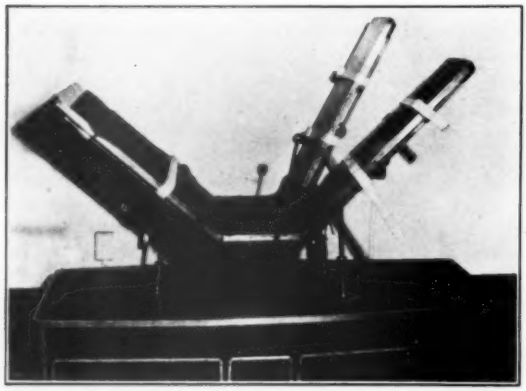


Fig. 2. — Head and leg boards in elevated position.

Indications for Use

1. *Back Conditions.* — We have found one of the most frequent uses of the hydraulic table to be in treatment of patients with subacute low back strain. This group of patients includes those who have a history of a definite back injury followed by acute pain. Roentgenograms are negative or may show minimal hypertrophic changes and no symptomatology suggestive of nerve root irritation. When the acute episode has subsided, there very often is inability to flex the spine forward without pain, and increase in mo-

tion may be obtained by the combined use of gentle stretching in the prone position with lowering of the head and foot boards while heat is applied to the back. The increase in motion which is obtained is then utilized in active exercises in the same position before the patient assumes an upright posture. Occasionally for patients who are suspected of having a ruptured disk, similar treatment may be indicated for a time if operation does not seem indicated. Patients with chronic recurrent postural back strain very often have increased lordosis and may benefit by use of the table in this same way.

In poliomyelitis during convalescent stages, increased motion in the back, either for flexion or for extension as desired, may be secured by the same technic. In the case of scoliosis the table may be utilized to increase mobility in the lateral plane with the patient in the side-lying position. This is usually done only prior to spinal fusion. One may also use the table as an aid to maintain motion in the spine in the presence of early rheumatoid spondylitis. Stretching is always followed by active exercises.

2. *Hip Contractures.* — We have found this table particularly valuable in treating flexion contractures of the hips, provided there is not a simultaneous contracture of the knee. When the contracture is associated with rheumatoid arthritis, one appears able to obtain lessening of muscle spasm and increased range of extension by using the technic of stretching on alternate sides without the necessity of manually fixing the pelvis. The stretching is slow and should be without pain. The same technic can be used if extension is limited after a vitallium mold arthroplasty of the hip. Amputees with hip flexion contractures may also be successfully stretched on the split leg boards. Soft tissue contractures following trauma, such as burns, or from immobilization we have found to respond favorably in many instances.

3. *Hamstring Tightness.* — Shortening of the hamstrings so commonly seen in patients with poliomyelitis during the convalescent and late stages may be treated by gentle stretching with the patient in the supine position with head and leg boards elevated to tolerance. The same method is used if there is tightness of the hamstrings in connection with mechanical back strain or secondary to immobilization in bed for any prolonged illness.

Summary

A manually operated hydraulic exercise table has been described. Gradually raising or lowering of the back board and split leg boards has been found an effective method of stretching tight structures of the back and hips, especially when combined with other physical therapeutic procedures.

Technic of operations and instructions for use are outlined.

EXERCISE IN THE TREATMENT OF ASTHMA *

FRANCES BAKER, M.D.

SAN MATEO, CALIF.

Asthma has many causes. Once it has begun, the patient acquires a dread, a fear of attacks, which may of itself bring on attacks once the pattern is established or greatly increase the magnitude of an attack stimulated by the primary cause. Exercise in the treatment of asthma has been prescribed in recent years either alone or routinely in combination with some type of medication. If the cause is definitely known and definite treatment can be prescribed, then it can accompany the program of exercise. If it has no definite place, a well planned program of exercises is sufficient in itself. At the beginning of treatment it may be well to use an antispasmodic until the pattern is established.

The aim of the program of exercise in asthma is, first, to train the patient into the correct pattern of breathing, and, second, to develop the general motor system back to normal power and control. Such a program can be adapted either to children or to adults. Asthma is most usual in nervous, tense persons. In children, one finds the parents showing tenseness and frequently showing more fear of the next attack than do the children. Training in the correct manner of breathing as opposed to the form assumed in asthma gives the patient a means of controlling the attack and a weapon by which he can overcome his fear.

Functional Anatomy

The diaphragm is the principal muscle of inspiration, taking its origin from the back of the xiphoid, from the lower six ribs and their cartilages, from the medial and lateral lumbocostal arches and the lumbar vertebrae. It takes the form of a dome with its concavity toward the abdomen. The central part of the dome is tendinous, while the circumference is muscular. During normal inspiration the lowest ribs are fixed, and from these and the crura the muscular fibers contract and draw the central tendon downward and forward. The curvature of the dome is only slightly altered but moves downward, pushing before it the abdominal viscera against the relaxed abdominal wall. The diaphragm stands highest when the subject is in the horizontal position; hence with normal respiration the diaphragmatic respiratory excursion is greatest in this position. When the body is erect, the dome of the diaphragm falls, and in the sitting position it falls still further, thus decreasing the respiratory excursion. This may explain the desire of dyspneic patients to sit up.

The intercostal muscles keep the spacing of the ribs, while with vigorous respiration the muscles attached to the upper part of the thorax come into action. The shoulders and vertebral borders of the scapulae become fixed, and the trapezius, serratus anterior, pectoral and latissimus dorsi muscles are called into play. When the head is fixed, the scalenus and sternocleidomastoid muscles elevate and fix the clavicles and sternum. As this occurs, the first rib is forced to rise and so the other ribs have to follow.

Deep expiration is effected by the recoil of the walls and by the contraction of the anterolateral muscles of the abdominal wall and the serratus

* Presented at the Instruction Seminar, Twenty-Eighth Annual Session of the American Congress of Physical Medicine, Boston, Aug. 30, 1950.

posterior inferior and transversus thoracis. Inspiration is short as compared with the time required for expiration.

The patient with asthma develops an incorrect pattern of breathing, which soon manifests itself between episodes as well as during attacks. The forward head and forward shoulders are acting as fixed points for the musculature of the neck and shoulder girdle. These are acting to elevate the clavicles, sternum and ribs so that the anteroposterior diameter of the chest is definitely increased. The upper abdomen is drawn inward with inspiration instead of ballooning outward, with a consequent tendency to narrow the sternocostal angle, although the continued elevation of the ribs widens this angle. If one examines the patient in the erect position with the fluoroscope it will be found that as he inhales the dome of the diaphragm may rise slightly rather than descend or the dome may be seen to flutter without changing its position. At times it remains fixed and is usually depressed below normal because of the expansion of the lower chest. This tendency to elevate or flutter without moving downward is recognized as "reversed breathing."

The cause for these pathological changes in the muscular action of respiration in asthma is sufficiently well known for our purpose. At the time of an asthmatic attack the involuntary musculature of the bronchioles goes into spasm and markedly decreases their diameter. They may contain plugs of mucous. A valvelike action is set up, whereby air is drawn into the alveoli but cannot be expired. This is due to the partial opening of the bronchioles with inspiration followed by complete closure as expiration is attempted. Air hunger cuts short the voluntary attempt at expiration and forces the patient to try to pull more air into the lungs. This difficulty with expiration is characteristic of asthma alone. All the voluntary muscles of the neck and upper chest wall become overactive. The upper abdominal muscles contract, pressing the viscera upward against the diaphragm, and with the elevation of the ribs it loses its fixation, thus preventing it from lowering with its normal contraction though it may be lower than normal owing to the distention of the lungs. Since the abdominal muscles are in active contraction, a reciprocal relaxation may explain partially the inactivity of the diaphragm. After several attacks this type of breathing may persist even between episodes so that the elevated chest and poor posture remain and the diaphragm fails to move actively. Vital capacity is markedly decreased. The patient tries to avoid any attempt at effort, any strain such as coughing or laughing or any unusual situation for fear of bringing on an attack. Children fail to do well at school, and the parents take on an attitude of dread often conveyed to the children.

Examination

The posture of the patient is routinely poor. The tight cervical and upper trunk muscles are seen to elevate the clavicle sternum and ribs; the shoulders are pulled forward and upward, accentuating the kyphosis. The anteroposterior diameter of the chest is increased; the respiratory excursion is markedly decreased, since the chest wall is held at its almost complete limit of expanded motion. With each inspiration the upper abdomen frequently is sucked inward or fails to move outward as it should with downward pressure of the diaphragm. The sternocostal angle is narrowed. Respirations are frequent and shallow and gasping. The vital capacity is definitely below normal.

Fluoroscopic examination is of interest in noting the elevated position of the ribs, but it is of particular importance in noting the motion of the

diaphragm with respiration. With inspiration it rarely moves downward as with normal motion but either remains fixed or is seen to rise slightly. The dome may flatten slightly and flutter.

It is important not only to examine the patient for the general contours mentioned but to measure expansion at the nipple line and at ninth rib the vital capacity and, fluoroscopically, the diaphragmatic movements. Photographs are also helpful. These concrete tests should be made at intervals to estimate the progress of the patient for his own benefit and that of the examiner.

Plan of Treatment

I. Relaxation. — The patient lies on his back on the treatment table with a pillow under his head and, if more comfortable, with another one under his knees. General relaxation of the body is emphasized; a modified method of Jacobson can be used. Weiser uses massage to the back and chest, feeling that he can get better relaxation. I have not thought this necessary but it might prove worth while. He uses stimulation massage—heavy kneading, tapping and clapping until the skin shows a definite reaction.

II. Retraining in the Breathing Pattern. — The attention is upon the diaphragm and upon the long expiration. In the supine position the diaphragm normally rides high, and so the patient can note its greater excursion when he begins to move the diaphragm downward with inspiration and the sternocostal angle begins to broaden as the upper abdomen bellies outward rather than sucking inward, as it does when the diaphragm remains fixed or flutters upward. The patient places his hands upon the lower ribs. He is given a word-picture that will demonstrate the action of the diaphragm. He can think of the chest as a box, the bottom of which is the diaphragm, which can be pushed downward with inspiration so that it pushes the viscera downward, and the upper abdomen is felt to balloon outward as the lower rib cage opens to increase the sternocostal angle. It can, in like manner, be thought of as a piston. As the patient's attention is held by the diaphragm, the muscles controlling the upper chest can relax. While this technic is practiced on the inspiration, the long expiration can follow and the patient can press medialward on the lower ribs. This pressure should be very firm. The assistant can augment it. Heavy pressure on the rib cage helps to bring it back to more nearly normal size and shape. The expiration can be timed so as to emphasize its prolongation. It can be hummed or whistled. Blowing emphasizes the idea of expiration. Children can be asked to blow up balloons, make soap bubbles or blow out lighted matches or candles. As the air is expelled from the alveoli, there is space for fresh air in them, and as the diaphragm moves downward more air can be brought into the lungs. All of this helps to make the patient more comfortable, as it relieves his air-hunger, and slows the number of respirations per minute. The vital capacity varies before and after treatment. It is well to have the patient check his vital capacity just before treatment and after its completion, as the second one is 200 to 300 cc. higher.

After the patient has control of the diaphragm in the supine position, he is asked to continue the diaphragmatic control and the rhythmic breathing with the long expiration in the sitting position. It is often necessary to return to the horizontal position many times before it can be carried through to the erect position. As control is gained exercises are instituted to stretch the shortened muscles — cervical, scapular, etc. All muscles must regain their normal length and power. If the patient is seen before contractures

have occurred the prevention of contractures is of special importance. Resistive exercises not only improve power but cause the patient to increase the depth of respirations. This may cause coughing or tend to bring on an asthmatic attack. Controlling the diaphragmatic movement and keeping the prolonged expiration may permit him to abort the attack. He has then a simple concrete method of controlling his regular breathing and aborting at least minor attacks. This helps to allay fear and to give him self confidence. More strenuous exercises can be added, and, particularly, the child or young adult should take up sports, including boxing, and competitive games to give him a feeling of equality with his fellows. The parents or relatives should understand the program so that they can not only insist upon the correct breathing and the routine exercises two or three times each day but also be ready to insist upon them if the beginnings of an attack become evident. For example, the wife of one patient frequently noted change of breathing while he was asleep. When awakened, he started his controlled breathing and consistently aborted attacks.

One can see that cooperation of the family and of the patient is absolutely essential. With increase in muscular power and improved respiration, the expansion of the chest and vital capacity are markedly increased.

This program must be closely followed by the physician. He should see the patient at frequent intervals. Time is saved by seeing the patient daily in the beginning and releasing him to longer intervals only as control is gained. If the patient receives the necessary encouragement at the beginning, he will continue to put the effort into it. Since fear has to be overcome, real authority is needed to make the patient persevere and to gain the necessary assistance of relatives. Real confidence must be obtained. In the beginning so much mental effort as well as physical effort goes into the first attempts that the period of treatment has to be brief. The patient can practice for a few minutes and then try to relax completely. As proficiency is gained, the working period lengthens and the rest period shortens. As the assistive and resistive exercises for the muscles of the neck and shoulder girdle and chest can be increased, the working period lengthens. The patient should spend forty to sixty minutes at each treatment time with the doctor or under his close supervision. The training in any competitive activity must be closely observed not only to obtain the best psychological benefit but to obtain the increasing amount of exercise to force respiratory effort to the limit without losing control of the attacks. As the program must be fitted to the individual, one cannot say just how long he must be treated daily and how fast the intervals of treatment can be prolonged. It is better to err on the side of frequency than to lose control of the patient. He should remain under supervision for months.

The home program must be definitely outlined. The patient should carry out the breathing program two or three times daily and always when an attack seems imminent. He frequently does better in the morning as asthmatic attacks are less apt to occur at this time. He is rested. He can practice where fresh air is available. In the evening relaxation should be emphasized and breathing corrected. This relieves the distention of the alveoli and overcomes air hunger thus putting the patient in a better state for sleeping. This program must continue indefinitely even after the patient is no longer under the supervision of his physician.

Such a plan of treatment as I have outlined is basic. Ideas present themselves as the individual patient is studied. The important thing is to know that exercise can be of great, if not the greatest, importance to the patient with asthma if it is carefully planned and diligently directed.

MANAGEMENT OF DECUBITUS ULCERS IN THE PARAPLEGIC PATIENT *

GORDON S. LETTERMAN, M.D.
CHARLES S. WISE, M.D.
and
WILLIAM CAREY MELOY, M.D.
WASHINGTON, D. C.

Rehabilitation of the paraplegic patient constitutes one of the most significant and dramatic achievements in the medical annals of this decade. For the first time the paralyzed man was cared for, treated, and regarded as an individual rather than as just another cord injury. This amazingly humanitarian accomplishment was made possible only by the cooperative efforts of a group of specialists highly trained in a variety of diversified fields.

The prevention and treatment of bedsores in these patients presented a difficult but challenging problem to the plastic surgeon. Ultimately large ischial, sacral and trochanteric decubitus ulcers were closed permanently by the use of regional flaps and grafts. This paper particularly concerns itself with the management of such ulcers. Consequently, it is especially important to emphasize that prevention, rather than cure, of debilitating bedsores must be our aim.

Normal skin will not withstand continued pressure or tissue ischemia. The loss of sensation in the paralyzed patient breaks the reflex arc initiated by uninterrupted weight bearing and terminated by bodily movement. Compared with pressure, trophic influences are of minor etiological importance in the development of decubitus ulcers. If such ulcers are to be prevented, prolonged pressure ischemia must not occur. It may be averted by frequently turning the patient. This is facilitated by the Stryker frame. An air mass mattress with its alternating pressures is of great benefit.

Physical therapy methods are of considerable value in the prevention of decubitus ulcers. Use of luminous heat for 30 minutes twice daily to the more vulnerable areas will maintain more adequate vascular supply to skin and subcutaneous tissues. However, care must be exercised in the application of heat to these areas because of the anesthesia present, which would enhance the possibility of a burn. General application of ultraviolet radiation for a minimal erythemal response, later followed by increased pigmentation, affords increased skin resistance to the formation of decubitus ulcers.

Skin must be kept dry and clean or ulceration results. The paraplegic patient should be bathed and thoroughly dried at regular and frequent intervals. Urinary spillage may be overcome by a program directed toward the development of automatic micturition. Suprapubic cystotomies are detrimental and rarely, if ever, indicated. Fecal contamination should receive immediate attention. Clean, dry skin, free of pressure points, will even in the paralyzed man withstand the rigorous activities of daily life.

Unfortunately, the initial care of the paraplegic patient is frequently entrusted to the inexperienced or is complicated by casts, transportation,

* Read at the Twenty-Eighth Annual Session of the American Congress of Physical Medicine, Boston, Aug. 31, 1950.
* Department of Surgery (Dr. Letterman and Dr. Meloy) and the Department of Physical Medicine (Dr. Wise), George Washington University School of Medicine.

wounds or burns. Bedsores are, unhappily, all too often the result. Not one, but a multiplicity of factors, have contributed to the closure of decubitus ulcers that 10 years ago were considered inoperable and, for practical purposes, incurable.

Infection is a deterrent to ulcer healing. Contaminating bacteria flourish and multiply unless something is done to starve, remove or annihilate them. Antibiotics and chemotherapeutic agents aid only in control of such infections. Their eradication depends upon the management of the local lesion. Contamination is prevented by aseptic technic. Organisms are starved by careful and early débridement, which removes slough and secretions. Actual mechanical cleansing of the bedsore and the proper application of surgical dressing effectively remove bacteria. The ulcer and surrounding skin should be vigorously scrubbed several times daily with an active detergent. pHisoderm is one of the best. The entire area must be dried both manually and with the aid of luminous heat. Local irradiation of an infected area with a cold quartz lamp following vigorous cleansing has a bactericidal effect and serves to stimulate the granulating underlying tissue. Dry sterile fine mesh gauze dressings should be reapplied whenever needed.

Protein, in the form of body reserves, is an absolute necessity for eradicating the decubitus ulcer. The role of protein nutrition in the etiology of the common bedsore has been studied. A certain amount of pressure applied with sufficient force and for a significant length of time to a local area of even normal tissue can cause necrosis of that tissue. Protein malnutrition, however, so changes the character of the tissues that it takes a smaller amount of pressure exerted by the recumbent body for shorter periods of rest to produce tissue necrosis and characteristic ulcerative lesions. The excessive loss of nitrogenous products by way of the urine and from the denuded surface, as well as the progressive regression in blood protein concentration, indicates that the body protein stores are rapidly depleted in the patient with a chronic bedsore.

Healing of the decubitus ulcer is a complex phenomenon. Tissue exudates, cellular growth, bacterial flora, capillary reactions, protein metabolism, vitamin utilization, enzyme systems, hormone activity and certain intrinsic factors of specialized tissues are all of major importance.

Once the skin continuity has been broken and a decubitus ulcer created, it must be determined whether to await healing by use of conservative measures or to institute active plastic surgical repair. Superficial small ulcerations should heal with minimal scarring unless further loss of tissue is produced by pressure, contamination, ill chosen topical applications or improper dressings. Treatment that holds infection to a minimum, supports the general condition of the patient and does not injure tissue, will result in the most rapid spontaneous healing possible.

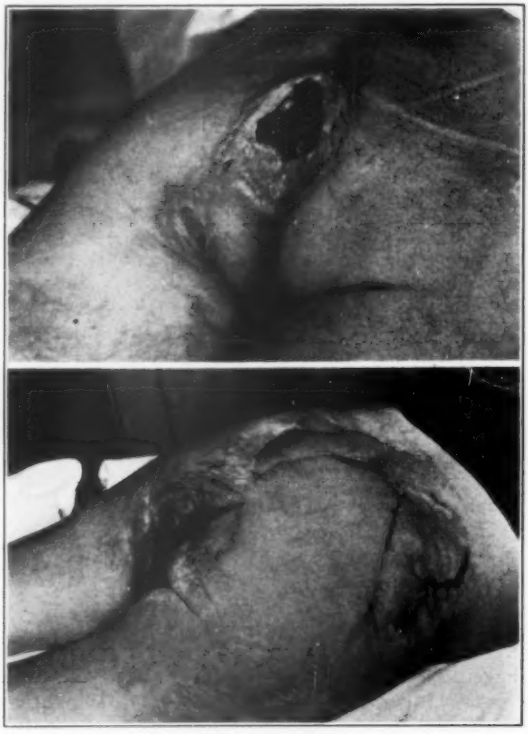
The preoperative period is occupied by urologic and orthopedic procedures. Nitrogen balance is achieved, infection eradicated, anemia corrected, vitamin intake fortified and the local lesion prepared. Large chronic bedsores should be closed surgically at the earliest possible moment. The complete ulcer with its underlying bony prominence must be removed. Repair is completed by the use of regional flaps and grafts (fig.).

Physical reconditioning and training are highly valuable in the preoperative period. Exercises to provide strong upper extremity and trunk muscles should be started early. In most instances the patient can be and is best instructed in the use of braces and crutches prior to any plastic repair.

Exercises increase the general and local circulatory efficiency. The successful rotation of a skin flap depends upon this local efficiency.

Early preoperative and postoperative ambulation has been found to be perhaps the most important single physical therapy aid in hastening healing processes. The effects of ambulation on nitrogen balance are well known, and our clinical experience indicates that the healing of plastic surgical procedures occurs much more rapidly in the semiambulant patient than in the patient who has been at prolonged bed rest.

On the seventh to the tenth postoperative day the patient may be braced and lifted from the cart to the floor without placing excessive pressure on the operative site. Full activity is gradually resumed. Very often ambulation with braces and crutches is permitted for a period of several weeks before the



Upper: large sacral decubitus ulcer. Complete ulcer and underlying bony prominences must be excised to prevent recurrence. Lower: repaired sacral defect. A regional flap of skin and subcutaneous tissue covers the sacral area. Split thickness skin graft resurfaces the flap donor site.

patient is allowed to sit in a wheel chair. During this period he is maintained on either a suitable Stryker frame or a bed during the time that he is not ambulating. This is particularly important after repair of ischial decubitus ulcers.

An enthusiastic and well planned rehabilitation program directed by an energetic and inspiring physician is more essential for the ultimate success

of the plastic surgical procedure contemplated than any antibiotic or detail of surgical technic. Close cooperation between the physiatrist and the plastic surgeon is essential for optimum results. Very often determination as to where the plastic surgical procedures are carried out is influenced by the type of bracing or support which will be required in the individual case. This calls for close teamwork among the various specialists comprising the rehabilitation team. Indeed, the maintenance and restoration of body surface becomes significant only when it is carried out as a part of a plan for total restoration of activity. It is only then that a plastic repair becomes more than a mere plug for a protein leak or a road block barricading bacterial entry into the bedridden paralyzed body.

SPECIAL REPORTS

Consideration of Health Resorts by the Council on Physical Medicine and Rehabilitation.

Howard A. Carter, M.E.,
Secretary of the Council on Physical Medicine and Rehabilitation.
Chicago.

In 1938 the Board of Trustees of the American Medical Association created a Committee of American Health Resorts charged with the responsibility of investigating and listing these institutions. The Board appointed the following members: Drs. Bernard Fantus, William P. Holbrook, Miletus B. Jarman, Walter S. McClellan, and Euclid M. Smith. The late Dr. Fantus was appointed the first chairman.

A health resort is defined as "an institution which gives major attention to the use of the special climatic and other natural therapeutic resources including mineral waters, peloids, etc., with which it is endowed by reason of its location." While the use of the natural resources is the prime object or purpose of the institution, other remedies may be applied. An earlier study of health resorts by a Special Committee of the American Medical Association was undertaken in 1880.[1]

The Committee first prepared a questionnaire that was sent to known health resorts asking for information as to their medical facilities, medical supervision, domiciliary and recreational facilities and natural resources that might be used for therapy.

The list of health resorts was compiled from various sources, including books, government publications, the records of the American Congress of Physical Medicine, tourist guides and miscellaneous sources.

Through a survey by questionnaire and correspondence, a comprehensive list of health resorts in the United States were developed, including those with and without medical facilities. Not more than 10 of them were found to be under medical supervision — that is to say, under the direction of a physician.

Next, the Committee proceeded to establish and define certain minimal fundamental standards that would assure the safe and efficacious use of natural therapeutic resources according to the best established scientific procedure then known.

The Rules and Regulations of the Committee on American Health Resorts were published in 1942. There followed a period of study of the therapeutic value of health resorts, and the Commitee was the sponsor of a review of the therapeutic value of them and sixteen articles on the subject which were published in the *Journal of the American Medical Association*.[2]

Dr. W. W. Bauer, Director of the Bureau of Health Education of the American Medical Association, was requested to handle the business of the Committee at headquarters. Previous studies on spas were carried out by a Committee appointed by the American Congress of Physical Medicine under the Chairmanship of Dr. Walter S. McClellan. The members of the Committee were Drs. R. Kovács, F. H. Krusen, C. I. Singer, E. M. Smith and H. Wolf. The American Medical Association was urged by this Committee to take over active sponsorship because of its greater facilities to review and evaluate institutions and therapeutic programs. After several years, the Committee had accumulated considerable information relative to health resorts, and this information was filed in the office of the Committee.

The number of institutions that made voluntary application for consideration was

* Read at the Twenty-Eighth Annual Session of the American Congress of Physical Medicine, Boston, Aug. 30, 1950.

1. Transactions of the American Medical Association 31:537, 1880.

2. By writing to the Secretary of the Council on Physical Medicine and Rehabilitation, a list of references to these articles will be made available.

disappointingly small. An analysis of the reasons showed that the vast majority of the health resorts were unable to comply with the rules. One important requirement that apparently could not be met was that the health resort be under medical supervision. Many of the spas throughout the country were owned by persons without adequate medical training, such as chiropractors, osteopaths, nurses, naturopaths and laymen. The managers of the health resorts may have felt that there would be no chance for listing. Of some 200 resorts operated in the United States, only three were listed in 1947. That year the Board of Trustees examined the activities of the Committee and decided that it be abolished.

Then the Committee on American Health Resorts asked that the activities be placed under the direction and sponsorship of the Council on Physical Medicine and Rehabilitation. The Council regards health resorts as potential rehabilitation institutions and agreed to take over the activities but limited the scope of work of the Committee to fit the budgetary allotment of the Council. In other words, the Board of Trustees was willing that the work of the Committee proceed but was unwilling to contribute any more funds toward it without better evidence that more could be accomplished.

In due time, the Council on Physical Medicine and Rehabilitation reviewed the official rules of the Committee, the procedure and the application. In the light of past experience, it revised these documents and brought them up to date. The revised rules and application were made available to the health resorts and additional information was received from some of them. In 1948 it was learned that 27 health resorts were under the direction of a physician, as contrasted with 10 in 1933, but that only four institutions had made application for consideration and were listed. Thereafter, renewed activity was observed, and a few more health resorts that felt that they were qualified, made application.

The Council has listed the following resorts (1950): Saratoga Spa, Saratoga Springs, N. Y.; The Baker, Mineral Wells, Texas; The Majestic (Torbett), Marlin, Texas; The Homestead, Hot Springs, Va.; The Health Resort of the Army and Navy General Hospital, Hot Springs, Ark., and The Buie Health Resort, Marlin, Texas.

Certain fundamental problems with respect to health resorts and organized medicine are not easily solved. First, the general practitioner fears nonmedical direction at health resorts. This is understandable because most of the health retreats are owned and directed by nonmedical persons. Furthermore, the average general practitioner, or the family physician, does not believe that much can be accomplished over and above what he can do at home for his patient. Second, the cost of treatment and lodging at health resorts is high, and for an average citizen in the United States to spend time and money at a spa is practically out of the question. In order to make a service available to the average patient, ways and means will have to be worked out to reduce the cost of treatment and lodging at a health resort.

Whereas the health retreats and spas have built up a clientele in European countries, they have not received wholehearted support in the United States. Advertising matter for health resorts in Europe (and this country, too) is frequently misleading, exaggerated and unwarranted. It contains claims for cures or relief of symptoms of disease that cannot be substantiated. In some instances, commercialized gambling is tolerated in the health resort or in nearby buildings operated by the health resort. The evils that ensue are not conducive to improvement of health.

The Committee does not advise the Council to list hospitals, clinics, infirmaries, sanatoriums or hotels, since the Council on Medical Education and Hospitals approve all such institutions, except hotels. Only the facilities for administering the therapeutic procedures used in physical medicine and rehabilitation are considered — in other words, the physical therapy equipment and personnel at a bathhouse. A study of the nomenclature applicable to health retreats is needed.

In the opinion of the Council, there is a place for health resorts in American medicine. The picture is changing slowly; more spas are becoming interested in being listed. The Council desires to improve the relations between the general practitioner and the spa physician and to reduce the cleavage which now exists. It is the opinion of the Advisory Committee on American Health Resorts that the spas in the United States are as good as, if not better than, those which have been highly publicized in Europe.

The Council has prepared the following material which is available upon request:

1. Rules for Listing of American Health Resorts.

2. Application Blank for Listing Health Resorts.

3. List of Accepted Health Resorts.

4. List of Health Resorts Not Accepted but Under Medical Direction.

5. Exhibit on American Health Resorts — An Educational Exhibit for the Professional and the Lay Public.

The present Advisory Committee on American Health Resorts consists of Drs. F. A. Hellebrandt; M. B. Jarman; Frank H. Krusen, ex-officio; Walter S. McClellan, Chairman, and Euclid M. Smith.

Members
Standing Committees of the
American Congress of Physical Medicine
1951

Advances in Education

Earl C. Elkins, M.D., Chairman.
Donald A. Covalt, M.D.
Harold Dinken, M.D.
Frederic J. Kottke, M.D.
George M. Piersol, M.D.

Balneology and Health Resorts

Hans J. Behrend, M.D., Chairman.
Robert L. Bennett, M.D.
Kristian G. Hansson, M.D.
Frances A. Hellebrandt, M.D.
Walter S. McClellan, M.D.
William D. Paul, M.D.
Samuel A. Warshaw, M.D.

Constitution and By-Laws

Fred B. Moor, M.D., Chairman.
Madge C. L. McGuinness, M.D.
Benjamin A. Strickland, Jr., M.D.
George D. Wilson, M.D.

Cooperation With Army, Navy, Public Health and Veterans Administration

Alvin B. C. Knudson, M.D., Chairman.
Emmett M. Smith, M.D.
Anton A. Tratar, M.D.

Cooperation with Food and Drug Administration

Charles S. Wise, M.D., Chairman.
Gervais J. P. Barger, M.D.
Gordon M. Martin, M.D.
Oscar O. Selke, Jr., M.D.

John Stanley Coulter Memorial Lecture Fund

Walter J. Zeiter, M.D., Chairman.
Ben L. Boynton, M.D.
Walter M. Solomon, M.D.

Finance

Frank H. Krusen, M.D., Chairman.
Roy W. Fouts, M.D.
Walter M. Solomon, M.D.

Foster, Encourage and Co-ordinate Research Projects

Ora L. Huddleston, M.D., Chairman.
Don J. Erickson, M.D.
Donald L. Rose, M.D.

Gold Key Awards

Walter M. Solomon, M.D., Chairman.
Robert L. Bennett, M.D.
Gordon M. Martin, M.D.
Howard A. Rusk, M.D.
William B. Snow, M.D.

Legislation

H. Worley Kendell, M.D., Chairman.
Frederic T. Jung, M.D.
Isadore Levin, M.D.

Medical Economics

William Bierman, M.D., Chairman.
Arthur M. Pruce, M.D.
Herman L. Rudolph, M.D.

Meeting Place

Walter J. Zeiter, M.D., Chairman.
Walter J. Lee, M.D.
Sedgwick Mead, M.D.
Max K. Newman, M.D.

Membership

Ben L. Boynton, M.D., Chairman.
Frances Baker, M.D.
Donald A. Covalt, M.D.

Nominating

Miland E. Knapp, M.D., Chairman.
H. Worley Kendell, M.D.
Earl C. Elkins, M.D.
Walter S. McClellan, M.D.
Fred B. Moor, M.D.

Problems Affecting Physical and Occupational Therapists

Donald L. Rose, M.D., Chairman.
Robert L. Bennett, M.D.
Shelby Gamble, M.D.
Jessie Wright, M.D.

Public Relations

Frank H. Krusen, M.D., Chairman.
A. Ray Dawson, M.D.
William H. Schmidt, M.D.

Awards for Scientific Exhibits

Robert W. Boyle, M.D., Chairman.
Fritz Friedland, M.D.
Sedgwick Mead, M.D.

MEDICAL NEWS

Physical Therapy at University of Pennsylvania

Due to a national emergency, the newly organized School of Auxiliary Medical Services of the University of Pennsylvania plans to admit students this coming February to a one-year certificate course in physical therapy.

The decision to proceed forthwith to the enrollment of a physical therapy class for February was prompted by the present increased demand for physical therapists in U. S. military and veterans' hospitals, as well as in centers actively engaged in the treatment of infantile paralysis cases.

New York Society of Physical Medicine

The regular February meeting of the Society will be held Wednesday evening, February 7, 1951, 8:30 p.m., in the New York Academy of Medicine Building, 2 East 103rd St. A technical forum is scheduled for 8:00 p.m.

For the scientific session there will be presented "Evaluation of arteriosclerotic peripheral vascular disease and its treatment by physical medicine," by Dr. B. S. Troedsson, with discussion opened by Dr. Irving Leinwand, (by invitation), and "Surgical refrigeration with reference to atomic injuries," by Dr. Frederick M. Allen, (by invitation), with discussion opened by Dr. Frank K. Safford, Jr. Members of the medical profession are cordially invited.

At an earlier meeting of the New York Society of Physical Medicine, the following program was presented: "Peripheral Vascular Disease" by Karl Harpuder, M.D.; "Exercise" by Hans Kraus, M.D.; "Psychiatry" by Richard Beck, M.D.; "Electrodiagnosis" by Joseph Moldaver, M.D.; "Cerebral Palsy" by William Benham Snow, M.D., and "Physical Medicine-Rehabilitation" by Donald Covalt, M.D.

The officers for 1951 are as follows:

President — Sidney Licht, M.D., 30 Hillside Avenue, Cambridge, Mass.

Vice-President — Hans J. Behrend, M. D., 470 West End Avenue, New York 24, N. Y.

Treasurer — Morton Hoberman, M.D., 27 Magaw Place, New York 33, N. Y.

Secretary — Madge C. L. McGuinness, M.D., 48 East 62nd Street, New York 21, N. Y.

Executive Committee:

Irwin D. Stein, M.D., Chairman.
Arthur S. Abramson, M.D.
William Bierman, M.D.
Nila K. Covalt, M.D.
Hans Kraus, M.D.

Pennsylvania Academy of Physical Medicine

"Rehabilitation of the Hemiplegic: The Third Phase of Medical Care" and a clinical presentation on reflex sympathetic dystrophy: The shoulder-hand syndrome were presented by Drs. William H. Schmidt and Charles A. Furey at the regular monthly meeting for January of the Academy. The meeting was held in the auditorium of Jefferson Medical College.

Laurel Hospital and Clinic

Under the medical direction of Nicholas D. Mauriello, M.D., the new Laurel Hospital and Clinic has opened to receive patients. The hospital is located in Wilkes-Barre, Penna. The new institution will not only serve general medical and surgical cases, but will be one of the few hospitals in Pennsylvania with a complete department of physical medicine and rehabilitation and special facilities for the treatment of chronic illnesses and nervous disorders.

Detroit Institute of Physical Medicine and Rehabilitation

Announcement is made by Dr. Max K. Newman and Dr. Lewis Cohen of the opening of the Detroit Institute of Physical Medicine and Rehabilitation, located at 16861 Wyoming Avenue, between McNichols Road and Puritan Avenue, Detroit 21, Mich.

New Rehabilitation Center

The Board of Directors and the Department of Physical Medicine and Rehabilitation of the Jewish Sanitarium and Hospital, Brooklyn, held formal dedication exercises in December for their new rehabilitation center.

Study V-A Operations

Carl R. Gray, Jr., Administrator of Veterans Affairs, has announced selection of the management engineering firm of Booz, Allen & Hamilton of Chicago, to conduct a study of Veterans Administration organization and operation.

The survey will be for the purpose of determining whether changes in organization and operational procedures are necessary to provide the best possible service to veterans at the lowest possible cost.

(*Continued on page 44*)

ARCHIVES of PHYSICAL MEDICINE

OFFICIAL PUBLICATION AMERICAN CONGRESS OF PHYSICAL MEDICINE

.·. EDITORIALS .·.

AMERICAN BOARD OF PHYSICAL MEDICINE AND REHABILITATION

The next examinations for the American Board of Physical Medicine and Rehabilitation will be held in Philadelphia, June 16 and 17, 1951. The final date for filing applications is March 31, 1951. Applications for eligibility to the examinations should be mailed to the Secretary, Dr. Robert L. Bennett, Georgia Warm Springs Foundation, Warm Springs, Georgia.

MAINTAIN EDUCATIONAL STANDARDS

The Holiday Season with its merrymaking and vacationing is over. We are back at work faced with the problems and responsibilities of the New Year. Never since the early days of World War II has the outlook for the people of this country been more grim and threatening. Those of us primarily concerned with physical medicine are now called upon to bear our share of the burden imposed by grave national emergencies. This situation presents to physical medicine, especially, a great challenge. The number of qualified physical therapists graduated each year from approved schools, at the present time, is not sufficient to meet the civilian demands. This shortage will be significantly increased by the requirements of our steadily expanding armed forces and the necessity for providing properly trained physicians and therapists to care for the casualties returned from the Korean theater of operations.

In order to meet the shortage thus created, pressure will be exerted to accelerate education in physical medicine. The temptation to cut corners and lower educational standards in an effort to make more physiatrists and physical therapists available must be firmly resisted. Advances and improvements in all aspects of education in physical medicine, both professional and technical, have been outstanding. There can be no regressions from the high standards set. It is the responsibility of those who direct educational programs in this field to steadfastly oppose lowering the scholastic requirements and educational aims.

Since the close of World War II there has been widespread appreciation of the importance of fundamental and clinical research in the field of physical medicine. Although significant progress has been made, there still remain countless problems in physical medicine and rehabilitation that call for investigation. Misconceptions, misunderstandings and empiricism continue to play too great a role in the practice of physical medicine. Their ultimate elimination depends upon the continuation of the many research programs that are now well established. It would be deplorable if the exigencies of the present and future national crises are allowed to curtail investigative progress. If such a dangerous tendency develops it must be energetically met by all who have the interests of physical medicine at heart.

In the future, as has been the case in the past, all who have dedicated themselves to physical medicine, physiatrists and therapists alike, can be counted upon to contribute unselfishly and patriotically to the needs of their government and their country. Let us, therefore, begin the New Year with a firm resolution that in so doing we will continue to work for and maintain the high educational and scientific standards that have been developed in physical medicine.

MEDICAL USES OF ULTRASONICS MUST BE CONTROLLED

A quarter of a century ago when short wave diathermy was comparatively new the manufacturers of such equipment, particularly European firms, flooded this country with short wave diathermy devices. An intensive sales program was entered upon in an effort to create a widespread demand for short wave diathermy apparatus among physicians. As a result of such exploitation, countless doctors began to use short wave diathermy before its physiological effects were fully appreciated, and indications and contraindications for its use as a therapeutic agent were well understood.

History is repeating itself in connection with the development of ultrasonic apparatus capable of delivering sound waves of tremendously high frequency, which when applied to the human body generate significant degrees of heat in tissues. The therapeutic value of sound waves in the treatment of many diseases has been explored by a number of European clinicians and investigators. Their published reports suggest that the application of sound waves induces clinical improvement which exceeds that observed with other forms of therapy. A critical review of these records leaves one skeptical as to the reliability and scientific accuracy of many of the claims made. Nevertheless, in spite of present uncertainty as to the status of ultrasonic therapy, European manufacturers of such equipment are now endeavoring to introduce these machines of foreign manufacture into this country with the hope of gaining for them widespread acceptance among American physicians.

It is undeniable that ultrasonic irradiation is capable of bringing about definite changes in human tissue. Whether these changes are due to thermal, mechanical or chemical stimuli or a combination of these, as yet is not clearly understood. How sound waves affect various pathological conditions, what disease states are favorably influenced by such therapy and the dosage that may be applied to human beings without inducing irreversible reactions in tissue are pertinent questions that can only be answered after carefully controlled investigation. In several institutions in this country studies of a fundamental as well as clinical nature are underway on the medical application of ultrasonic therapy. Already several contributions on this subject have appeared in this Journal, notably those published by investigators from the Mayo Clinic. The indiscriminate, uncontrolled use of ultrasonic therapy should be frowned upon until more specific data on the indications for and dangers inherent in its use are available.

The validity of this position is recognized by the Federal Government. Through its appropriate agencies permission is being withheld for the manufacture, widespread commercial distribution and importation of ultrasonic apparatus designed for medical purposes. It is rightly contended that until more specific and accurate information as to the ultimate effects of ultrasonic radiation is available, the medical profession and the people in this country should not be subjected to the exaggerated and often unsubstantiated claims of manufacturers and importers. Thus it is hoped that in the case of ultra-

sonic therapy a repetition of the unfortunate circumstances that surrounded the introduction of short wave diathermy will be avoided.

HOSPITAL ADMINISTRATORS, ATTENTION!

According to the presently accepted definition, physical medicine includes the employment of physical and occupational therapy in the diagnosis or treatment of disease and in medical rehabilitation. After numerous conferences and endless discussion, it is now quite generally agreed that, in keeping with this definition, occupational therapy is an integral part of physical medicine. Therefore, it is regarded as an appropriate administrative procedure in hospitals in which there is a Department of Physical Medicine for Occupational Therapy to come under the direction of the physician in charge of this division of the hospital. Such an arrangement is not only theoretically sound but administratively desirable, since it makes for better cooperation between the two types of therapy which constitute the foundation of physical medicine.

That this concept, now so widely accepted, is not clearly understood by all hospital administrators is apparent. An example of such a misunderstanding occurred during the past year in one of the largest and oldest general hospitals in the United States. The hospital under consideration wisely re-activated a Department of Occupational Therapy which had been allowed to drift into a state of semi-somnolence. This much needed re-organization was accomplished by the appointment of a chief occupational therapist and several additional therapists, all of whom are well trained, properly qualified, efficient individuals. The work which this new group is now performing is highly satisfactory and beyond criticism. Unfortunately, however, Occupational Therapy was established as an independent unit, reporting directly to the Medical Director of the Hospital; not as a section of the Department of Physical Medicine under the supervision of the Director of that Department.

The right of the Medical Director of a hospital to organize the professional personnel as he sees fit is admitted. It is, however, unfortunate that in a hospital of such importance as the one under consideration, accepted views as to the proper organization of the Department of Physical Medicine should be so disregarded. As was to be expected, a certain amount of disunity and lack of coordination, borne of conflicts in authority has manifested itself. Artificial separation of therapeutic activities, which normally fall within the scope of physical medicine, is particularly undesirable in an institution in which an extensive rehabilitation program is being developed. Much of the time of the occupational therapists is devoted to patients on the neuropsychiatric, cardiac and tuberculosis services, where their supervision and direction comes under the physicians in charge. There are, however, in this particular hospital a significant number of beds, soon to be materially increased, set apart for rehabilitation patients who are the medical responsibility of the Director of the Department of Physical Medicine. In his capacity as Chief of the Rehabilitation Service he is responsible for the activities of the occupational therapists engaged in that important segment of their work, functional occupational therapy. Since these therapists are not under his administrative supervision an anomalous situation is created which makes for conflict, confusion and lack of efficiency. It is apparent, therefore, that in the organization of Departments of Physical Medicine in general hospitals greater attention should be paid to the proper assignment of administrative authority.

Medical News

(Continued from page 40)

The study, which will begin approximately January 15, 1951, will encompass a thorough study of the V-A Central Office in Washington, District Offices, Regional Offices, Centers and Hospitals in Field locations.

All phases of the V-A's operations will be included in the scope of the study.

Rehabilitation Center in St. Louis

Washington University's plans for a rehabilitation center at the School of Medicine in St. Louis were given impetus this month when Mrs. Oscar Johnson, widow of the late shoe manufacturer, pledged 6,000 shares of the capital stock of the International Shoe Company to be applied to the project. Present value of the stock is $240,000. The sum is to be used with other gifts to construct a building that will house the occupational therapy and physical therapy research laboratories. Plans for the center were drawn up after consultation with Dr. Howard Rusk.

Rehabilitation Conference

On February 21, 1951, the Bay State Society for the Crippled and Handicapped, Inc., will hold a one-day Rehabilitation Conference at the Copley Plaza Hotel in Boston.

The morning meeting will include a discussion and demonstration of the Bay State Society Rehabilitation prospects in Springfield, Worcester and Boston. The luncheon speaker will be Mr. Eugene J. Taylor, New York City Field Representative of the National Society for Crippled Children and Adults. In the afternoon, George G. Deaver, M.D., Attending Physician in Physical Medicine at the Lenox Hill Hospital, New York City, will conduct a Demonstration Clinic.

GI Education

Veterans of World War II planning GI Bill education and training are reminded by the Veterans Administration that the July 25, 1951, cut-off date for starting courses is only seven months away.

Veterans actually must have commenced their training by the cut-off date if they want to continue afterwards, VA said.

He will be expected to pursue his training "continuously until completion, except for conditions which normally would cause interruption by any student."

Special consideration will be given to four categories of veteran-trainers who, for reasons beyond their control, either may not be able to resume their training by July 25, 1951, or may not be in a position to remain in continuous training afterwards.

The categories are (1) veterans who have started GI Bill studies and interrupt them to go back into active military or naval service; (2) veterans who completed pre-medical and pre-dental GI Bill schooling and can't get into a medical or dental school by deadline time; (3) teachers who spend their summers taking training leading to a degree, and (4) those who complete GI Bill undergraduate courses and intend to go ahead with graduate training which would start after the deadline date.

Cerebral Palsy Research Council Meeting

The newly formed Research Council of the United Cerebral Palsy Associations, Inc., at its first meeting estimated that one million dollars will be required for an effective research attack on the problem of cerebral palsy. The council, under the chairmanship of Dr. Sidney Farber, assistant professor of pathology at Harvard Medical School, Boston, also adopted a recommendation to "establish an institute to meet in the near future to assemble all known, relevant information in order to better determine the needs for specific research projects and to stimulate interest in investigation in this field." As a start on the research program a check for $30,000 was given to the new group by Leonard H. Goldenson, president of the United Cerebral Palsy Associations. The money was raised in the association's first annual campaign last May.

The first anniversary meeting of the United Cerebral Palsy Association was held in New York. Recent scientific advances in diagnosis, research and treatment of cerebral palsy were discussed by Dr. Winthrop M. Phelps, Cockeysville, Md.; Dr. Farber; Dr. Temple S. Fay, Philadelphia; Martin F. Palmer, Sc.D., Wichita, Kans.; Dr. Samuel M. Wishik, New York; Maurice H. Fouracre, Ph.D., Buffalo; Dr. George J. Miller, Hicksville, L. I., N. Y., and Dr. Albert A. Martucci, Philadelphia.

AEC Offers Four Fellowships in Industrial Medicine

The U. S. Atomic Energy Commission will offer four fellowships in industrial medicine for the 1951-52 academic year. The program is administered for the AEC by the Atomic Energy Project of the School of Medicine and Dentistry, University of Rochester, Rochester, N. Y., and fellows are selected by a committee headed by Dr James H. Sterner, Associate Medical Director of the Eastman Kodak Co. and Consultant in Industrial Health to the AEC.

The purpose of the special fellowship program is to provide advanced training and on-the-job experience to men and women medical doctors in the field of industrial medicine, particularly in relation to the atomic energy industry.

Awards are for one year's academic training at approved institutions of the fellows' own choos-

ing. After completion of this training, fellows will be eligible to apply for a second year's in-plant training at one of the major installations of the AEC. The stipend for the first year's training will be $3600, plus tuition and laboratory fees, and for the second, or in-plant, year, $5000.

The fellowships are open to citizens of the U. S. who hold an M.D. degree from an approved medical school and who have had at least one year of internship. All fellows must be investigated by the FBI and cleared by the AEC for access to restricted data before entering on their fellowships.

Applications for the 1951-52 fellowships should be submitted by March 1, 1951 to A. E. C. Fellowships in Industrial Medicine, Atomic Energy Project, School of Medicine and Dentistry, University of Rochester, Rochester, New York.

Research Study of Toys

A research study of toys to determine their therapeutic and play use for crippled children has been initiated by the American Toy Institute in cooperation with the National Society for Crippled Children and Adults.

The aim of the study is to find toys particularly useful in working with crippled children and to find what specific purpose each toy is to serve.

The participating centers will study which toys are useful in such therapy as stimulating a desired bilateral motion, finger strengthening, or motivating, walking or crawling. They hope to find toys that would help parents of crippled children carry out the directions of the therapist at home.

National Society Crippled Children and Adults

The National Society for Crippled Children and Adults will hold its 1951 annual convention in Chicago, October 3 through 6. Sessions will be held in the Palmer House.

As a service to parents of crippled children and to physicians and others working with them, exhibit space will be made available to scientific, professional organizations, to publishers of medical and technical books and manufacturers of specialized equipment.

Institute of Industrial Health

General Motors has announced a $1,500,000 research project to promote better health for its 446,000 employes as well as the men and women of all American industry. It joined hands with the University of Michigan in establishing The Institute of Industrial Health at Ann Arbor, Mich., whose broad objectives will be research, education and service in industrial medicine, health and safety.

The Institute will be under the supervision and control of a Board of Governors to be appointed by the University's Board of Regents.

Medical Education and Licensure

The forty-seventh annual congress on medical education and licensure will be held Monday and Tuesday, Feb. 12 and 13, 1951, Palmer House, Chicago. On Sunday, Feb. 11, there will be an open meeting in the Crystal Room, Palmer House, of the Advisory Board for Medical Specialties.

Henry Cogan

It is with regret that we announce the death of Henry Cogan of Buffalo, New York. Dr. Cogan was a member of the Congress for many years.

Newly Registered Therapists

November 10, 1950

Coghlan, Carolyn A., 669 S. Poplar Ave., Kankakee, Ill.

Croxford, Marilyn L., 5711 Hiway Place, Everett, Wash.

Dicus, Mr. Robert G., 5757½ Corbett St., Los Angeles 16, Calif.

Feldman, Mr. Harold, 315 S. Glasgow Ave., Inglewood, Calif.

Giessman, Mrs. Fern H., 2320 Ocean View Ave., Los Angeles 5, Calif.

Henry, Ethel L., 2658 Monroe St., Long Beach 10, Calif.

Horine, Fern Anita, Box 433, Margarita, Canal Zone.

Jadeson, Mr. Walter J., 6814 Sunset Bld., Los Angeles 28, Calif.

Jenks, Barbara L., 1656 Beach St., San Francisco 23, Calif.

Mack, Mr. Joseph D., 4525 Fountain Ave., Los Angeles 27, Calif.

Nielsen, Mrs. Clarice E., 2320 Ocean View, Los Angeles 5, Calif.

Skophammer, Mrs. Lucille R., 601 Erie St., Valparaiso, Ind.

November 28, 1950

Beck, Elizabeth J., 5005 Westminster Terrace, San Diego, Calif.

Breuer, Mr. Jos. M., 186 Lexington Ave., New York, N. Y.

Grimes, Mary, Coast Route, Monterey, Calif.

Horkman, Lavinia A., 704 W. 44th St., Kansas City, Mo.

Iriki, Keiko K., 1401 Blake St., Berkeley 2, Cal.

Jong, Maelene M., 753 Jackson St., San Francisco, Calif.

Low, Mr. Henry S., Jr., 1400 Stannage Ave., Berkeley, Calif.

Murray, Mr. William, 3525 Decatur, Bronx 67, N. Y.

Musacchia, Evelyn F., 612-B W. Foothill Blvd., Monrovia, Calif.

Perez, Mr. Joseph, 575 Blossom Way, San Leandro, Calif.

Plumberg, Mr. Robert F., 4710 Bellview, Kansas City, Mo.

Richardson, Ruth C., Black Mountain, N. C.

Schoenfeldt, Ruth A., 258 Amherst Ave., Berkeley 8, Calif.

Starr, Mr. Joseph, 70 Baker St., San Francisco, Calif.

Walker, Dale S., 3730 Canfield Rd., Pasadena 8, Calif.

Wall, Mr. John P., 2811 N. Tejon, Colorado Springs, Colo.

Weinert, Marjorie, 818 Cordilleras, San Carlos, Calif.

Wilshire, Joan M., 808 Corbett Ave., San Francisco, Calif.

December 12, 1950

Isaacs, Mr. Arnold J., 9430 W. Washington, Culver City, Calif.

Kiefer, Mrs. Sheila Job, 550 Piaget Ave., Apt. K-14, Clifton, N. J.

Marton, Mr. Theodore, 24-19 23rd Ave., Long Island City 5, N. Y.

Mayberry, Mr. Robert P., 223 Williams, Vallejo, Calif.

Moore, Jeannette Truax, R. D. 1, Wilkes-Barre, Pa.

Nicholson, Mrs. Enrica, 112 175th Place, New York, N. Y.

Stockfleth, Lilian B., Morse Lakes, Box 296, Bloomingdale, N. J.

Webber, Lillian R., 349 Pleasant St., Malden, Mass.

Wellington, Emily, % Mrs. H. Cunningham, Cedar St., Duxbury, Mass.

IMPORTANT NOTICE

Certified diplomates of the American Board of Physical Medicine and Rehabilitation who wish to replace their certificate which carried the former name, American Board of Physical Medicine, may order a replacement certificate at a cost of $3.00. Orders and checks should be sent to the American Board of Physical Medicine and Rehabilitation, 30 North Michigan Ave., Chicago 2, Illinois.

29th Annual Session

SCIENTIFIC EXHIBIT SPACE

Requests for applications for scientific exhibit space in connection with the 29th Annual Session to be held at the Shirley-Savoy Hotel, Denver, Colorado, September 4 to September 8, 1951, are being received. Address all communications to the American Congress of Physical Medicine, 30 North Michigan Avenue, Chicago 2.

BOOK REVIEWS

METHODS IN MEDICAL RESEARCH. Governing Board *Irvine H. Page*, Chairman; *A. C. Ivy, Colin M. MacLeod, Carl F. Schmidt, Eugene A. Stead, David L. Thomson.* Volume 3, *Ralph W. Gerard*, Editor-in-Chief. Genetics of Micro-organisms, *S. E. Luria*, Editor. Assay of Neurohumors, *J. H. Gaddum, Editor.* Selected Psychomotor Measurement Methods, *Walter R. Miles*, Editor. Methods for Study of Peptide Structure, *Choh Hao Li*, Editor. Fabrikoid. Price, $7.00. Pp. 312. Illustrated. The Year Book Publishers, Inc., 200 East Illinois Street, Chicago 11, Illinois, 1950.

Volume III of "Methods in Medical Research" will find a ready welcome among those working in the disciplines covered. This volume is under the able editorship of Professor Ralph Gerard of the University of Chicago. There are four sections; one, entitled genetics of micro-organisms under the direction of associate editor S. E. Luria, Associate Professor of Bacteriology, Indiana University; section two, the assay of neurohumors under associate editor J. H. Gaddum, Professor of Pharmacology, University of Edinburgh; section three, selected psychomotor measurement methods under associate editor Walter B. Miles, Professor of Psychology, University of Toronto; and section four, methods for study of peptide structure under associate editor Choh Hao Li, Professor of Biochemistry, University of California. Such a galaxy of scientists has insured a most critical selection of material. Each section is subdivided into chapters written by an authority in his respective field.

The need for such a volume is evident when one considers how difficult it is to find collected anywhere an appraisal and discussion of the various methods that have been proposed for the solution of some experimental problem. It is in addition quite difficult to get a paper published that deals solely with a technic. It often happens, too, that a method is modified and improved in continued use, either in the laboratory whence it originated or elsewhere, and such useful modifications find their way into print, if at all only as brief and scattered indications. Apparatus of ever greater potency, procedures of ever greater delicacy, require ever greater know-how for their successful use. Workers rarely find even in the never-fully-adequate written word, the help that would minimize their own expenditures of time in mastering a needed method. The editors of these volumes have performed a most valuable service in successfully surmounting these handicaps.

Sections one and four might not appeal to the physiatrist except as a means of broadening his horizon. Section two and particularly section three should be valuable, however, to those physiatrists who are doing, or interested in, research. The section on the assay of neurohumors should be read in conjunction with Rosenblueth's recent volume on the transmission of nerve impulses. The physiatrist will find much to interest him in section three. There are chapters on bicycle ergometry; reaction time; coordinated motor responses; manual dexterity; eye-movement coordinations; and motor tests of laboratory animals.

Each chapter is amply illustrated and closes with related references. The volume is well indexed both as to subject matter and authors cited. To those physiatrists interested in research this volume is highly recommended.

POST-GRADUATE LECTURES ON ORTHOPEDIC DIAGNOSIS AND INDICATIONS. By *Arthur Steindler*, M.D., F.A.C.S., Professor of Orthopedic Surgery, State University of Iowa, Iowa City, Iowa. Vol. I. Section A: Propedeutics in Orthopedic Diagnosis. Section B: Congenital Deformities and Disabilities. Cloth. Price, $7.50. Pp. 289 with illustrations. Charles C Thomas, Publisher, 301-327 East Lawrence Avenue, Springfield, Ill, 1950.

This is a group of 11 lectures given by the author to his students on orthopedic subjects. The first section contains four lectures on what he terms "propedeutics in orthopedic diagnosis." or material that should be considered before specific orthopedic subjects are discussed. The first lecture is on symmetry and asymmetry of the body, in which the subject of joint motion is presented. His method of joint measurement may not be the simplest, but it is complete and permits a record of movement in all the different planes. The second lecture is entitled "On contractures." The causes for contractures, both extraarticular and intraarticular, are explained on a physiologic and mechanical basis. The third lecture, on the interpretation of pain "in orthopedic surgery," might better be labeled "pain in the extremities." This is a fine chapter and contains much clinical help. The various types of pain, localization, radiation and other features are carefully analyzed. The last lecture in this section is on the pathology of gait. Considerable material is borrowed from the author's excellent book on "Mechanics of Normal and Pathological Locomotion in Man."

The second section, of seven lectures, considers congenital deformities and disabilities and includes such subjects as chondrodystrophies, talipes, dislocation of the hip, the deformities of the extremities and spine, malformation by excess and others.

The book is not one on technical orthopedic surgery nor an all inclusive textbook; thus it should have a wide appeal. Dr. Steindler is a brilliant teacher of many years experience. He demonstrates this by presenting the material clearly and interestingly. The first section contains fundamental principles that are a part of physical medicine particularly, whereas the second section has clinical information that will be valuable.

The book has numerous well reproduced illustrations and roentgenograms, and the printing and make-up are of the highest standards.

PROGRESS IN BIOPHYSICS AND BIOPHYSICAL CHEMISTRY. Edited by *J. A. Butler*, Chester Beatty Research Institute, Royal Cancer Hospital, London, and *J. T. Randall*, F.R.S., Wheatstone Professor of Physics in the University of London in King's College. Cloth. Price, $6.80. Pp. 279 with 119 illustrations. London Butterworth-Springer Limited and Academic Press Incorporated, 125 East 23rd Street, New York 10, New York, 1950.

Most books on biophysics, particularly those dealing with the progress of biophysics, at the present contain nothing except work with radioactive isotopes. It is a welcome relief to find a book on progress of biophysics which has only one chapter on radioactive isotopes, namely, a paper by Loudit on the Tolerance of Man for Radioactive Isotopes.

This book by nine English authors gives an excellent review of some of the other important fields in biophysics. It contains an article by Gutfreund of Cambridge on the properties of solutions of large molecules, an article by Rudall of the University of Leeds on fundamental structures in biological systems, an article by Oscar of the Royal Institution on the scattering of visible light and x-rays by solution of proteins and a short paper with illustrations by Hughes of Cambridge on the Technical Usability of Phase-microscopy in Biological Research, which does not give the technic of this method, but shows in a few well chosen words and illustrations exactly what the phase-microscopy can do in contrast with ordinary microscopy. It contains also an article on local refractometry by Philpot of the atomic energy research establishment at Harwell, an article by Engstroem of the Nobel Institute in Stockholm on assay by soft x-rays.

The two articles which are of the most immediate importance to the physiatrist are an article by Crane of the Medical Research Council Unit for Research in Cell Metabolism on the bioelectric potentials, their maintenance and function, and an article by Pryor of the Zoology Department of Cambridge on mechanical properties of fibers and muscles. These two articles both covering a variety of references are worth the price of the book for those interested in our field. In Crane's article, this reviewer was particularly impressed by the discussion of the causes of biological potential differences in which there is a thorough discussion with excellent references on the different biophysical mechanisms which can produce biological potentials. It includes such recent problems as the reversal of the action potential, and the explanation of this phenomena on the basis of difference in permeability of sodium and potassium ions of the active and resting membrane, and the measurement of potential difference across the synovial membrane in which it was found that even if cell metabolism is completely inhibited, large potentials can still be found across a membrane. The explanation of this potential difference is very fundamental to our entire understanding of nerve and muscle membrane potentials.

The author makes a good point that there have been described at least five classes of possible origin of the potential difference across the membrane, and each has been proposed as the one and only theory of membrane potentials. The placement of these different contributions to the total membrane potential in their individual places is one of the major contributions of this very excellent article.

The effect of physiological changes on the bioelectrical potential is ably discussed. All through the article the American literature is reviewed as extensively as English literature. One might object that possibly a little bit too much attention has been paid to the work on ovulation potentials a little more than its importance seems to indicate. But here again the discussion given by the author is a very unusually complete one.

For the physiology of muscle, the electrophysiology of the electric fish and other electrical organs is of extreme importance as it is well known that there are certain analogies between the electric organ and muscles. These data are discussed in considerable detail.

The closing section of this article deals with biological potentials as a source of energy.

While the author concludes by saying that this review has probably raised more questions than it has answered, his readers owe him a vote of thanks for having brought together widely scattered data, and having taken the time to analyze their value and estimate the place that they take in the overall picture of the mechanism of bioelectric potentials. This superior article is followed with no fewer than 279 references which gives an idea of the amount of work which was put into getting it together.

The article by Pryor on mechanical properties of fibres and muscles is as equally an important contribution. The author starts out with a discussion on thermodynamics of elastic strains, considering the muscle as an engine for converting of chemical energy into mechanical work, operating by means of reversible strains in the working substance of the muscle protein. The different physical and mechanical factors are discussed, such as modulus of elasticity, viscosity, viscus elastic effect, etc. Comparisons with chemical substances, rubber among them, are made. The

chemical considerations are then applied to muscle. A crucial experiment is described which compares elastic properties and viscosity of muscle in both resting and active states. The interpretation which the author puts on it is obviously his and his alone, and other explanations would appear possible.

This article is again extremely valuable for those of us who are dealing with the function of muscle because it gives the basic biochemistry and energy considerations which underline active muscle function.

EYES AND INDUSTRY. *Formerly* INDUSTRIAL OPHTHALMOLOGY. By *Hedwig S. Kuhn,* M.D., Industrial Ophthalmologist, Hammond, Indiana. Second edition. Cloth. Price, $8.50. Pp. 378 with 151 text illustrations, including 3 color plates. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1950.

This excellent book is a second edition, the first having borne the title "Industrial Ophthalmology." In addition to the original chapters (now revised) on visual testing in industry, skills, standards, corrective programs, and eye protection, and the chapter (contributed by Albert C. Snell) on industrial eye injuries caused by solid bodies, there now are chapters on chemical eye injuries, radiation effects, and illumination. The chapter on the blind in industry, of special interest to those concerned with rehabilitation problems, has been expanded to 15 pages and includes a good bibliography. The book is written in vivid style, richly illustrated, provided with numerous references, and well indexed.

THE MANAGEMENT OF THE PATIENT WITH SEVERE BRONCHIAL ASTHMA. By *Maurice S. Segal,* M.D., Assistant Professor in Medicine, Tufts College Medical School, Boston. Publication Number 76, American Lecture Series. A Monograph in American Lectures in Chest Diseases, edited by *J. Arthur Myers,* M.D., Ph. D., F.A.C.P., Professor of Medicine and Preventive Medicine and Public Health, University of Minnesota Medical School, Minneapolis, Minnesota. Cloth $3.50. Pp. 158, with 16 illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 49 Broad St., Oxford, England; The Ryerson Press, 299 Queen St., W., Toronto 2B, 1950.

This is a small book that sets forth the author's methods of handling a most severe and distressing condition. The various measures that are employed are bronchiolar relaxation, bronchiolar evacuation, supportive therapy, management of the infection and preventive measures. Many medications and other agents are discussed, a few with approval and many with disfavor. Under miscellaneous procedures, three measures usually included in the field of physical medicine are considered, climatotherapy in which at least one year's residence in another climate "may be the only certain answer" or a "Caribbean or South American cruise are favored by many"; hyperpyrexia (by typhoid vaccine); and breathing exercises, which includes this advice "to become thoroughly adept at these exercises the patient should be under the guidance of a physical therapist." The book was completed before the steroids had had sufficient trial so that the author has added a few sentences in the preface in the manner of preliminary remarks.

AMPUTATION PROSTHETIC SERVICE. By *Earle H. Daniel,* Director of Prosthetic Service, Institute of Physical Medicine and Rehabilitation, New York University, Bellevue Medical Center, Prosthetic Consultant to: Bellevue, City, Goldwater Memorial, Metropolitan and University Hospitals, New York, New York. Foreword by *Howard A. Rusk,* M.D., Professor and Chairman of the Department of Physical Medicine and Rehabilitation, New York University College of Medicine; Director, Institute of Physical Medicine and Rehabilitation, New York University, Bellevue Medical Center. Cloth. Price, $7.00. Pp. 327 with illustrations. The Williams & Wilkins Company, Mt. Royal and Guilford Aves., Baltimore 2, Md., 1950.

Every now and then a book appears that has long been needed. Here in one volume are most of the answers about prosthesis that will interest the amputee, the surgeon, the limb maker, the family physician and particularly all persons in physical medicine. The care of patients with either an arm or leg prosthesis is not the work of one group of specialists but the teamwork of many. The amputee is probably the best example of what can be accomplished by a comprehensive program of rehabilitation and all that that implies. Writings about amputeees have usually been directed for the interest of a special group. In this book, everyone who cares for these patients will find helpful information. It is the total concept of the problem that makes it such an important book.

The first part of the book is on the lower limb amputations and the second part is on the arm. The following titles for some of the chapters on leg amputation show how thoroughly the subject is covered: sites of amputation, psychological treatment of the amputee, care of stump, limb selection and construction, component parts for artificial legs, leg fitting, walking training, employment of the amputee, etc. The author includes such information as the buyer's guide of prosthetic materials, list of limb and bracemakers, list of motion picture films which will assist those interested in prosthetic services, service organizations, all of which can be most practical.

The author has had as much experience as anyone in the care of patients with amputations. He knows their problems and the solutions. Sound advice is given about the many factors, for example the twenty rules for leg specifications, limb measurements, suggestions for prosthesis for children and many others. The latest developments in both the leg and arm prosthesis are considered.

The suction socket limb is properly evaluated and the recent advances brought out by special studies in the government services are discussed.

Physical medicine personnel, the physiatrist, physical and occupational therapist and anyone else who even remotely has contact with this group of patients will be grateful that this book has been published. It should be most useful and popular.

THE TRANSMISSION OF NERVE IMPULSES AT NEUROEFFECTOR JUNCTIONS AND PERIPHERAL SYNAPSES. By *Arturo Rosenblueth*. Cloth. Price, $6.00. Pp. 325, with 98 illustrations. Published Jointly by the Technology Press of Massachusetts Institute of Technology and John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y.

Rosenblueth of the Instituto Nacional de Cardiologia of Mexico needs no introduction to the United States. His association with Walter B. Cannon at Harvard led to many fruitful investigations into the field of neurophysiology. Jointly they published a monogram on the Autonomic Neuro-Effector Systems which has had a tremendous influence on the concepts of neurophysiology.

The present outstanding volume is an attempt to present in systematic form the knowledge of chemical transmission at the junctions of motor nerves with striated muscles and at the synapses in automatic ganglia.

The book is divided into two parts: the author presents in part one an up-to-date report of the facts on transmission and also reevaluates the theories accepted and defended by Cannon and Rosenblueth more than twelve years ago. Rosenblueth has expanded on such topics as adrenergic and cholingeric axons, the theory of the two sympathins and the electric responses of smooth muscle.

The second part of the book deals with the problem of transmission in peripheral synapses. An important amount of information has been acquired on this subject in the last decade. While many features of this transmission problem are still obscure, and, although the interpretation of many of them has not gained general acceptance, it is the author's belief that sufficient knowledge has accumulated to justify an attempt to elaborate a theory of the mechanism of peripheral synaptic transmission.

The author presents his facts and theories in a masterly and logical order that is most convincing. The language is concise, well written and very easily read. Each chapter ends with an excellent summary that will be greatly appreciated by the reader and part two is concluded with an excellent summary of the section. There are 720 references given at the end of the volume and an excellent author index.

For those interested in the rapidly expanding science of neurophysiology, this book is essential. Physical medicine is so intimately interwoven with neurophysiology that the physiatrist will find this a valuable addition to his library.

CONFERENCE ON PROBLEMS OF AGING; TRANSACTIONS OF THE TENTH AND ELEVENTH CONFERENCES, FEBRUARY 9-10, 1948 and APRIL 25-26, 1949. Edited by *Nathan W. Shock*, Chief, Section on Gerontology, National Heart Institute, Baltimore, Md. Paper, $3.75. Pp. 258. Josiah Macy, Jr., Foundation, 565 Park Ave., New York 21, 1950.

This is an interesting book on the conferences sponsored by the Macy Foundation. Eighteen subjects are considered with short preliminary remarks followed by the discussions. The discussions are the important feature of the book; they are informal, informative and show the thinking of some of the best authorities on this most important subject.

The conference of 1949 deals with the longevity studies of the laboratory animals. This comprises about three quarters of the volume. Many of the problems concerning the purchase of animals, their care, the use of equipment, the keeping of records, etc., are discussed. Many of these problems are quite formidable and are the cause of much worry for accurate investigation with animals. This reviewer, whose experience with animals' care is limited, was impressed with the concern for such factors as the effect of suddenly turning on the light in the animal room, the apparatus for collecting the excreta from rats, the effect on protein by having dogs bark at rabbits in the same room, and others.

The discussions are not without their humor. Dr. Korenchevsky from Oxford, whose solution to problems is different than it is "in such a wealthy country as the U. S.", for as a substitute for the installation of air conditioning in the animal room at $50,000-100,000, he ventilates his rooms by an electric fan with the results that he believes "the air in these rooms is nearly as fresh as in the boudoir of a beautiful lady." The title may be misleading but the students of this subject will find the book very stimulating.

EVALUATION OF INDUSTRIAL DISABILITY. Prepared by the Committee for Standardization of Joint Measurements in Industrial Injury Cases of the California Medical Association and Industrial Accident Commission, State of California. *Packard Thurber*, Sr., M.D., Chairman. Cloth. Price, $4.00. Pp. 96, with 80 illustrations. Oxford University Press, 114 Fifth Avenue, New York 11, 1950.

In reporting residual disabilities from industrial accidents a standardized method of measuring joint motion is essential. A committee in California has published this excellent book to aid physicians in making such accurate measurements. All major joint motions are illustrated by photographs and there is sufficient descriptive detail of method to instruct any doctors in joint measurement so that satisfactory medical reports may be recorded. The title is perhaps somewhat misleading as broader aspects of disability are not discussed.

PHYSICAL MEDICINE ABSTRACTS

Care of Children Convalescing From Poliomyelitis: Discussion of Several Points of Controversy. Robert L. Bennett.

J. A. M. A. **144**:377 (Sept. 30) 1950.

The over-all program is similar in all responsible and experienced medical units caring for patients with poliomyelitis and its after-effects. If the programs are so uniform, why does there exist so much controversy and indecision within each step, and why are end results often so inexcusably poor? The major points of conflict can be narrowed down to four issues: (1) hospitalization; (2) physical therapy; (3) inactivity, activity and apparatus and (4) surgery.

The period of hospitalization in poliomyelitis will depend on three factors, the amount of involvement, the age of the child and home conditions.

All too frequently the treatment program keeps the child hospitalized after the acute stage for six, twelve or even eighteen months and then the physician spends fifteen minutes presumably checking the child every three to six months in a crippled children's clinic until the patient is old enough for surgical treatment. It is far better to hospitalize the child for a shorter period initially and to readmit him at regular intervals for short periods of evaluation, specific treatment, fitting and instruction in use of apparatus and reinstruction of parents. It is only when faulty or inadequate care is given that long periods of hospitalization are necessary.

There is little doubt that physical therapy should be used and is the method of choice in convalescence after poliomyelitis, but there is much indecision about what type should be used, when it should be started and how long it should be continued.

In the early phases of convalescence, physical therapy has the great responsibility of helping to relieve pain and to restore and maintain normal mobility of the involved bodily segments.

As the need for certain orthopedic apparatus becomes apparent, physical therapy adapts its routines to include the most efficient and beneficial use of this apparatus. Much indecision and controversy exists as to how long one should continue attempts to coax back strength and function in severely weakened muscles.

If it becomes obvious that severe functional handicap will always be present, physical therapy then attempts to instruct the patient in the use of special apparatus to overcome specific functional problems.

The next points of controversy may be grouped together because of their close relationship: inactivity, activity and the use of apparatus. It may be said that the future of the child with even the mildest after-effects of poliomyelitis lies in the delicate balance of activity against inactivity.

Musculoskeletal deformities develop from one cause: persistent faulty use of muscle strength and/or persistent faulty skeletal alinement. Equally severe problems arise with faulty bodily mechanics of the patient at rest as during activity.

Activity, such as turning over in bed, sitting up in bed or in wheelchair and standing and walking, should be started as early as it can be done safely.

In the early stages of convalescence, apparatus must be thought of as a protection permitting safe activity while the basic program of rest and specific muscle reeducation is being carried out.

The Effects of Microwave Diathermy on the Eye: An Experimental Study. Louis Daily, Jr.; Khalil G. Wakim; J. F. Herrick; Edith M. Parkhill, and William L. Benedict.

Am. J. Ophth. **33**:1241 (Aug.) 1950.

In this study the effects of microwave diathermy on intact as well as on enucleated eyes of dogs were investigated. This study was done in order to determine the changes in the temperatures of the orbital tissues and aqueous and vitreous humors of the eye after exposure to microwaves. Different distances of the microwave director from the eye surface, various durations of exposure to microwaves and different power outputs of the generator were used in an attempt to establish a dose of microwaves which would not damage the eye. Furthermore, ophthalmoscopic studies were made on the eyes before and after exposure to microwaves; after enucleation, histologic sections and microscopic examination of the eyes were made in order to note the pathologic changes produced in the eye and to determine distances, durations, number of exposures and amount of microwave energy causing these changes.

The eyes of two animals that were repeatedly exposed, 6 and 10 times, respectively, to microwaves using 75 per cent of the output of the generator with the corner director at a distance of three inches (about eight cm.) for 30 minutes, so far have shown no clinically observable pathologic findings.

Eight exposures of the eye of one animal to microwaves once daily for 30 minutes, using 75 per cent output of the generator with the corner director at a distance of two inches (about 5 cm.), produced ophthalmoscopically observable anterior cortical cataract within six days after the last exposure.

Seven exposures of the eye of another animal to microwaves once daily for 30 minutes, using

98 per cent output with the director at a distance of only 1.5 inches (about four cm.), produced ophthalmoscopically observable anterior cortical cataract within 24 hours after the last exposure. Over a period of about nine weeks both of these anterior cortical cataracts increased in size and density and then regressed, and posterior cortical cataracts developed.

Similar clinical and histologic changes were produced in the eye of another animal within 24 hours after two exposures of 30 minutes each to microwaves, using 98 per cent output with the director at a distance of 1.5 inches (about four cm.) and, in addition, vitreous opacities, reddening of the optic disc, whitening and elevation of the retina in the region of the disc were observed ophthalmoscopically. Microscopic examination of stained sections of the eye in addition revealed erythrocytes, leukocytes, and fibrinous exudate in the anterior chamber with hemorrhage into the iris and ciliary processes. Necrosis of the stroma of the iris and disorganization of the pigment layer of the iris, and subchoroidal exudate and cystic degeneration of the retina were also observed.

Aureomycin in the Treatment of Poliomyelitis. Emanuel Appelbaum, and Raymond Saigh.

J. A. M. A. **143**:538 (June 10) 1950.

Thirty-eight patients with nonparalytic poliomyelitis were treated with aureomycin during the early phase of the disease, while 66 patients did not receive the drug and served as controls. The aureomycin-treated patients and the controls were admitted during the same period and were similar in all essential respects. The method of treatment and dosage have been described. The clinical results were about the same in the treated and the control patients. The development of paralysis in 2 of the treated patients but in none of the controls was regarded as fortuitous. In this study the use of aureomycin early in the disease did not appear to affect favorably the clinical course of poliomyelitis.

Midcentury White House Conference on Children and Youth. Henry F. Helmholz.

J. A. M. A. **143**:625 (June 17) 1950.

The theme of the Midcentury White House Conference — the development in children of mental, emotional and spiritual qualities that will lead to happy childhood and responsible citizenship — has been related herein to the general practitioner and his great opportunity for rendering services. An outline of the plans of the conference includes: (a) to bring together in usable form pertinent knowledge related to the development of children, and indicate areas in which further knowledge is needed; (b) to examine the environment in which children are growing up, with a view to determining its influence on them; (c) to study the ways in which the home, the school, the church, welfare agencies and other social institutions, individually and cooperatively, are serving the needs of children; (d) to formulate, through cooperative efforts of laymen and specialist proposals for the improvement of parental, environmental and institutional influences on children and (e) to suggest means whereby these proposals may be communicated to the people and put into action.

It is the first White House Conference in which youth is represented in the national committees and is taking an active part in the work of the councils and committees.

Sheltered Workshops. George G. Deaver.

Crip. Child. **28**:7 (June) 1950.

Rehabilitation of more than twenty-three million disabled persons is one of the major problems which our nation must solve. Congenital defects, accidents and disease have been the chief causes of physical disabilities. But our aging population is now contributing the largest percentage of disabled persons.

In considering job placement for the disabled the following factors must be considered. Has maximum physical rehabilitation been attained? Can this person travel to a job by the usual means of transportation and care for his daily needs while at work? Would it be possible to train him to perform these activities essential for daily living and working?

The sheltered workshop is one aspect of a work program which must receive greater emphasis. It is the place for work reconditioning and the proving ground where a final evaluation of the person's work potentiality can be made. Here therapy can be provided in a work program while the handicapped person is paid for receiving treatment. In planning a sheltered workshop, however, it is essential first of all to decide the purpose of the program, as there are many types of workshops.

There are two improper ways of conducting a sheltered workshop — ways which indicate less concern with the handicapped than with impressive production records. One of these is to select only those patients who have enough physical ability to turn out large volumes of work, enabling the workshop to fulfill contracts efficiently. The other improper approach is to retain handicapped persons who have acquired enough skill to go out into industry, but are kept in the workshop to bolster production records. The more efficient the workers become, the greater the desire is to keep them.

The ideal sheltered workshop for those handicapped by congenital defects, disease or trauma, who are in need of physical rehabilitation to meet the demands of daily living and working and the opportunity to gain skill and speed in productive employment best suited to their abilities and disabilities, required the following equipment and personnel:

(1) Sufficient space for a sheltered workshop and rehabilitation units which have facilities and

personnel to teach the disabled person how to work and meet his physical deficiencies in walking, climbing, self-care, better use of the hands and speech.

(2) A consultant physician to evaluate each person's disabilities and formulate his program.

(3) The rehabilitation units must have qualified physical and occupational therapists and speech pathologists who have the training and facilities to carry out the physical program.

(4) The director of the sheltered workshop should be a person with mechanical skill and imagination.

There are certain factors which may cause failure to meet the needs of the disabled in a sheltered workshop program:

(1) Do not spend money on the purchase of an elaborate building or equipment; or accept them as gifts. The success of the program depends upon trained and interested personnel and not on physical equipment.

(2) Do not measure success of the sheltered workshop by the number of disabled persons in the shop or the amount of work produced. Success should be measured by the number of people discharged from your shop to gainful employment in industry or who have been helped in meeting the physical demands of daily living and working.

(3) Do not accept work in the shop which is beyond the capabilities of your workers or which must be completed at a given time.

(4) Do not pamper disabled workers if you expect them to become productive workmen.

(5) Do not go outside of your community for the director of the workshop. Select a man who has worked in a mechanical capacity in a local industry who is interested in your project and disabled people. He will know the community resources for obtaining the type of work suited for the workshop and the possibilities for placing disabled workmen in industry. When you have selected your director, send him around the country to visit other sheltered workshops. The knowledge gained by visiting other workshops will pay large dividends.

Success depends upon outlining purposes, policies and objectives and having the industrial leaders of your community help you work out your plan.

Musc'e Fibrodystrophy in Children. Robert Bingham.

West. J. Surg. 58:288 (June) 1950.

This report is to call attention to a mild but more prevalent neuromuscular disorder which has not been previously described as occurring in children.

Muscle fibrodystrophy is defined as a chronic nonprogressive muscle dystrophy characterized by weakness and contractures of the skeletal muscles. It is found in childhood and adult life and is the cause of a type of chronic physical disability.

The typical patient is a slender child with poor posture, contracted back and hamstring muscles, who complains of being weak and easily fatigued. The majority of the patients with this condition were referred for orthopedic examination because of poor posture. This was usually the symptom first noted by the parents, or school and public health nurses in periodic health examinations. Other symptoms reported by the children or noted by their parents were excessive tiredness after exercise, muscle soreness, cramping in the muscles of the back or lower extremities after physical exertion, awkwardness in gait, clumsiness in movement and poor coordination in recreation and athletic sports. Some patients complained of "growing pains," in their muscles at night.

Muscle fibrodystrophy is a clinical syndrome characterized by shortness and contraction of body musculature, particularly in the dorsal spine and hamstring groups, although any and all muscle groups may be affected.

Muscle fibrodystrophy is one of the chief causes of poor posture in children, particularly lordosis and dorsal round back deformities. The most probable cause of muscle fibrodystrophy is mild and unrecognized or untreated acute poliomyelitis.

Muscle contractures caused by muscle fibrodystrophy do not disappear spontaneously and require treatment from three months to two years. The treatment consists of proper exercises, the applicatioa of moist heat, muscle stretching, exercises to bui'd muscle strength, and finally exercises for muscle coordination.

Psychosomatic Disorders of the Muscles, Bones and Joints. Werner P. Jensen.

Nebraska M. J. 35:179 (June) 1950.

Pains and aches of the musculoskeletal system are frequently of psychogenic origin. Perhaps the main attraction of orthopedic surgery to the medical student and interne is the false impression that in this field there will always be an roentgenogram film showing a fracture or some positive evidence of organic disease, or that there will be a deformity or visible or palpable cause for the complaints.

These persons can be helped occasionally by adjusting their lives. The occupation, environment and responsibilities may be beyond the mental capacity of the patient and the adjusting of this situation may relieve all of his symptoms. Rest, sedation, physical therapy and medication also are required in the treatment of a psychosomatic pain.

Bulbar Poliomye'itis. Maurice Lenarsky.

Arch. Ped. 67:250 (June) 1950.

Reviewed are the clinical aspects of bulbar poliomyelitis with emphasis on present day concepts. The importance of this subject lies in the fact that bulbar involvement produces the most serious form of the disease and accounts for almost the entire mortality attributable to poliomyelitis. The spinal type is not lethal except

where there is involvement of the muscles of respiration, and then death may result from either asphyxia, if the respirator is not available, or from pulmonary complications. Bulbar poliomyelitis calls for careful and continuous observation because skillful intervention at the proper time may be lifesaving.

Thus far there are no drugs which will alter the course of the disease. The use of Darvisul (phenosulfazole) is discussed. The controversial subject of tracheotomy in bulbar poliomyelitis is discussed. Transportation of the acute bulbar poliomyelitis patient over long distances may increase the mortality rate. Effectiveness of treatment of the bulbar poliomyelitis patient requires the cooperation of physicians and workers from allied fields, who form a "poliomyelitis team."

The Peril of the Sun Worshipper. A. R. Woodburne, and O. S. Philpott.

J. Kansas Med. Soc. 51:329 (July) 1950.

A review of harmful effects of excessive exposure to actinic rays with especial emphasis on preventive methods of treatment has been given in an effort to save many from early and late disease caused by excess exposure to sunlight.

Treatment of Painful Amputation Stumps. W. Ritchie Russell, and J. M. K. Spalding.

Brit. M. J. 4670:68 (July 8) 1950.

The treatment of painful amputation stumps by repeated percussion to the neuromata has proved successful in most cases. Of 33 cases considered suitable for percussion treatment, 19 reported good or excellent results and 5 were improved. There was only one failure in the first 15 cases treated, but in the last 18 cases, some of which were especially difficult, there were eight apparent failures. Methods of applying the treatment are described. The neuromata are located as accurately as possible. If they are tender the arterial supply to the stump is occluded by a sphygmomanometer cuff as anoxemia renders them less sensitive. Percussion is done with a mallet and an applicator about 15 cm. long. After several minutes the cuff is removed and percussion continued for twenty minutes. An electrical vibrator may be used in place of the mallet, and is of particular value in treating areas beyond the patient's reach. Cases with cold and diffusely tender stumps should be treated by sympathetic block or section rather than percussion.

Clinical Poliomyelitis in Association with Peripheral Inoculation of Prophylactics. F. O. MacCallum.

Brit. M. J. 4669:6 (July 1) 1950.

Poliomyelitis virus has been isolated from the stools of two children who had paralysis of a limb inoculated eleven and twelve days previously with certain vaccines. The virus has also been isolated from the stools of three children who developed poliomyelitis or encephalitis five to seventeen days after receiving a prophylactic inoculation without localization of paralysis in the inoculated limb.

It is recognized that the poliomyelitis virus is widespread during epidemic times, and no suggestion is made that the viruses isolated were necessarily responsible for the present illness of the patients. These strains will be used for experimental investigation of the problem of the effect of peripheral trauma in precipitating poliomyelitis or localization of paralysis in patients infected with or carrying poliomyelitis viruses.

Employment of the Physically Handicapped.

Edit. J. A. M. A. 143:974 (July 15) 1950.

It has been estimated that there are probably seven to eight million physically handicapped persons in the working population of the United States. About six million are said to be employed, a quarter of a million are disabled each year and about a million are either seeking work or can be rehabilitated and trained for work. Some are said to be in jobs for which they are not best suited, and this provides a hardship for the handicapped and a burden for the employer, even the taxpayer. Obviously it can be a cause of considerable waste. One of the solutions is better understanding and information, and attempts are being made to give more attention to the special aptitudes of these persons and to increased opportunity for training for better jobs. Successful application of such principles heightens productiveness, increases earning power and affects tremendously the morale.

Much has already been accomplished, but much also remains to be done. Communities have excellent opportunities to solve this problem locally. The aid of physicians should be sought, as proper placement in many instances will depend on medical advice. To gain this end, members of the medical profession can offer to advance their services. Any community can begin a program to foster rehabilitation, and community service organizations can play important roles. Physicians, particularly the general practitioner who sees much of the patients at some time, can aid in the forceful application of principles of rehabilitation. It is a worthwhile investment of time and interest.

Unilateral Exercise.

Edit. J. A. M. A. 143:559 (June 10) 1950.

Unilateral progressive resistance exercise has been shown to augment the strength and endurance of the limb exercised and also of the unexercised contralateral extremity. Previously published reports had mentioned this phenomenon and had served to draw attention to the possibility of cross education of extremities if the patient would cooperate and was properly trained. A recent report presents additional data on the influence of exercise on work capacity.

The restoration of function when loss of strength and endurance is the primary cause of the physical disability depends on systematic ex-

ercise in the "overload" zone. The amount of work performed must exceed that normally performed with ease. Furthermore, the voluntary cooperation of the patient is essential. To overcome fear of pain, unconscious malingering and other retarding factors, simple and readily accepted methods of augmenting work output are important.

Hellebrandt and Houtz postulated that the contraction of homologous parts might be sufficiently dynamogenic to excite the weaker side to increased effort since vigorous unilateral exercise elicits associated movements or increased tone in symmetrically disposed muscle groups.

The application of these observations to medical practice offers interesting speculation, especially in the field of physical medicine. As Hellebrandt and Houtz point out, it has long been known that forceful tonic contraction of the normal arm of a patient with hemiplegia produces associated movements in the paralyzed contralateral extremity. And the affected side of a child with infantile spastic hemiplegia involuntarily executes movements similar to those produced in the normal extremity, although the child cannot voluntarily produce such movements solely in the spastic limb. Other diseases show similar phenomena. The authors thus have concluded that return of neuromuscular function following injury or disease may depend on volitional exercise which must exceed work levels easily reached. More research in this field certainly seems indicated.

An Analysis of Paralytic Thumb Deformities. J. Leonard Goldner, and C. E. Irwin.

Bone & Joint Surg. **32-A**:627 (July) 1950.

Paralysis of the opposition unit of the thumb is a major disability. The degree of deformity depends primarily upon the anterior-horn cells affected, and the treatment hinges upon the resulting deformity. Furthermore, the status of the thumb is not constant, and the secondary changes which occur in bones, joints, and soft tissues make an ideal end result difficult. The factors of nerve supply, muscle strength, joint contractures, joint stability and vascular status must all be considered. The interval from onset of disease, the occupation, the general physical condition, and the stability of the remainder of the arm and forearm must be evaluated before reconstruction is attempted. The treatment of each thumb will vary according to the pathologic changes present. With these facts in mind, a general classification is outlined, and the variations in treatment are discussed.

The Mechanics of Deformities of the Hands in Atrophic Arthritis, and a Discussion of Their Prevention and Correction. James C. Small.

Ann. Int. Med. **32**:1087 (June) 1950

One of the earliest deformities in atrophic arthritis occurs in the hands. Characteristically, it develops into an ulnar deviation of the fingers with contractures at the metacarpophalangeal joints. This so greatly reduces the ability to use the hands that it may be regarded as one of the most distressing deformities of the disease. The morale of patients usually suffers less from their inability to walk than it does from inability to use the hands in some time-consuming occupation which might tend to shorten the long waking hours. Since more than 90 per cent of patients with this disease are women, this unsightly deformity wounds the patient's pride more than any other aspect of the disease. It cannot be hidden and constantly serves to advertise the affliction.

An anatomic imbalance in the antagonistic muscles which flex and extend the fingers is presented as the primary cause of the ulnar deviation deformity of the hands in atrophic arthritis.

A simple therapeutic exercise to strengthen the extensor muscles is suggested to correct and prevent these deformities.

The Importance and Function of Child Psychiatry. Robert P. Odenwald.

M. Ann. District of Columbia **19**:368 (July) 1950.

The process of growing-up is a complicated phenomenon. Too often development is regarded in terms of physical growth alone. A simple cold, a pain, or an ache arises, and the anxious parents consult the physician. Integral development consists of mental and emotional growth as well as physical and, therefore, the child psychiatrists stand side by side with the pediatrician. A blocking in emotional development is just as important etiologically in behavior disturbances as the blocking of the physical growth.

Apparently physical disturbances are emotionally conditioned and therefore require more than specific physical therapy such as medication.

Present-day parents, perhaps because of the tense atmosphere of our modern civilization, are not manifesting parental competency in rearing and educating their children properly. The modern home is no longer as it should be, the child's first school. No physician will doubt that maladjusted children are a danger for the coming generation and may increase the number of the mentally ill. Child psychiatry with its own special approach to therapy with children, especially in the form of play therapy, is all-important for the rearing of a future responsible, stable and mature citizenry.

The Blood Flow Through the Calf After Exercise in Subjects with Arteriosclerosis and Claudication. J. T. Shepherd.

Clin. Sci. **9**:49, 1950.

Various ergographs have been devised to determine the claudication time in subjects with intermittent claudication, but so far no attempt has been made to study the calf blood flows following the exercise. Observations have been made on 24 cases of arteriosclerosis. These were not selected

cases, but were the first 24 patients referred to the department for routine examination of their peripheral circulation. Twenty-three were nondiabetic males and one was a diabetic female. With the exception of this female and one male, each of whom had a pregangrenous condition in one toe, the skin in all cases was healthy. The primary complaint of all these patients was intermittent claudication.

An ergograph has been devised which, in conjunction with a celluloid plethysmograph, enables the exercise tolerance of the posterior calf muscles to be assessed and the post-exercise calf blood flows to be determined.

In 12 of these patients it was found that the calf blood flows failed to reach their maximum after exercise until some time had elapsed, this time varying from one to fourteen minutes with an average of about six minutes.

This phenomenon could be due either to diversion of blood into muscles proximal to the calf, constriction followed by dilatation of the calf vessels, or a combination of these two mechanisms. The evidence at present available does not allow a conclusion to be reached about the mechanism concerned.

Physiological and Performance Changes in Athletic Conditioning. F. M. Henry, and W. E. Berg.

J. Applied Physiol. **3**:103 (Aug.) 1950.

During the recent war period there was widespread use of performance tests for the assessment of "physical fitness." In general, these tests took the form of standardized runs and gymnastic stunts, the former presumably measuring speed or endurance, depending on the length of the run, while the latter tested agility. Fitness for muscular work was also measured by step tests and pack tests, which were thought to be improvements over running tests because they were better standardized and less influenced by special skills. A priori validation of these procedures, while perhaps justifiable as a temporary expedient, is not acceptable as a true measure of their value.

Determinations of oxygen debt and carbon dioxide surplus during the pay-off period after a moderate standard exercise were made on athletes before and after a regime of physical conditioning. Performance scores were also secured on a 300-yard run, shorter runs and stool-stepping to exhaustion.

All measures improved in the theoretically expected direction. Oxygen debt and carbon dioxide production were more effective than performance tests as measures of improvement in physical condition. Conditioning produced a more significant change in amount of debt than in the rate of pay-off. Among the performance tests, the longest run was most effective and the pack test least effective for measuring improved condition. The RQ of the recovery metabolism was not significantly affected by conditioning; neither was there an effect on the ratio index of endurance in running. Individual reduction in oxygen debt due to conditioning tended to show a small positive correlation with individual improvement in performance. In general, there was no correlation between size of the individual oxygen debt and individual performance scores. The experimental results were explained by a theory that individual performances in exhaustive exercises are largely determined by psychological factors and specific skills, rather than ultimate physiological limits. These tend to balance out in subtractive improvement scores, so that increased capacity can be demonstrated as a result of athletic conditioning. Actual fundamental capacity can be determined only by more direct methods such as oxygen debt measurements.

Immediate Treatment of Barbiturate Poisoning: Use of Electrostimulatory Therapy. Theodore R. Robie.

J. M. Soc. New Jersey **47**:370 (Aug.) 1950.

Since death from barbiturate poisoning is usually the result of paralysis of the respiratory center, the immediate amplification of respiratory movements from the beginning of electrostimulation, gives the physician an increased sense of security that he may save the patient.

Although the number of cases reported is small, the evidence already accumulated has convinced a panel of 12 psychiatrists that this method of treating barbiturate poisoning is efficacious and reliable, providing the patient has not ingested too large a dose. It is simple to administer, and there are no complicating sequelae of treatment.

Suicide and suicidal attempts by ingesting large doses of barbiturates have markedly increased in recent years. The chemical antidotes available have been disappointing. They fail to revive a considerable proportion of patients. A method which offers hope of producing recovery in a large proportion of cases and which is simple to administer, is now at hand. This is electrostimulation therapy.

Relieving and Relaxing

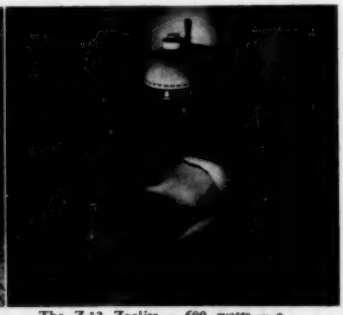
in sinusitis
arthritis
neuralgias
traumatisms

BURDICK ZOALITE
INFRA-RED LAMPS

A Burdick Zoalite, by increasing the local circulation and relaxing spasm, can accomplish considerable in relieving the distress of many local inflammatory conditions.

The Zoalite method of applying radiant heat is clean, convenient and highly efficient. Use the powerful Z-12 Zoalite in office and hospital, and prescribe the Z-70 Zoalite for use in the home, at low cost to the patient.

The Z-70 Zoalite — prescription model for use in the home over short or long periods.



The Z-12 Zoalite — 600 watts — a professional infra-red unit.

Burdick

THE BURDICK CORPORATION

MILTON, WISCONSIN

PHYSICAL MEDICINE **

The following services are approved by the Council on Medical Education and Hospitals of the American Medical Association and the American Board of Physical Medicine and Rehabilitation. Residencies in this specialty have been approved without specifying the number of years for which they are accredited. The Board will give appropriate credit for training in these hospitals on an individual basis.

Hospitals, 42 Assistant Residencies and Residencies, 55

Name of Hospital	Location	Chief of Service	Inpatients Treated	Number of Treatments	Asst. Res. & Residencies Offered §	Beginning of Service (1950)	Beginning Stipend (Month)
United States Army							
Letterman General Hospital★	San Francisco	A. E. White	21,861	185,113	2	1/1, 7/1	n
†Fitzsimons General Hospital★	Denver	H. B. Luscombe	21,090	281,585	4	———	n
Army Medical Center★	Washington, D. C.	E. M. Smith	8,676	134,137	6	7/1	n
Veterans Administration							
†Veterans Admin. Hospital ‡	Ft. Logan, Colo.	F. J. Fricke	4,610	58,879	1	———	n
Veterans Admin. Hospital	Chamblee, Ga.	G. D. Williams	4,923	39,181	1	7/1	n
Veterans Admin. Hospital	Hines, Ill.	L. B. Newman	20,052	472,950	2	1/1, 7/1	n
Veterans Admin. Hospital	New Orleans	S. Winokur	1,107	49,815	1	7/1	n
Veterans Admin. Hospital ‡	Framingham, Mass.	F. Friedland	9,000	24,000	2	7/1	n
Veterans Admin. Hospital ‡	Jefferson Bks., Mo.	S. Mead	4,046	53,320	2	7/1	n
†Veterans Admin. Hospital ‡	New York City	K. Harpuder	12,613	279,817	3	1/1, 7/1	n
Veterans Admin. Hospital ‡	Cleveland	H. T. Zankel	2,452	105,000	2	7/1	n
†Veterans Admin. Hospital	Aspinwall, Pa.	S. Machover	1,993	62,792	1	7/1	n
†Veterans Admin. Hospital	Portland, Ore.	E. W. Fowlks	4,395	96,766	1	1/1, 7/1	n
Nonfederal							
Los Angeles County Hospital★‡	Los Angeles	O. L. Huddleston	———	133,694	1	Varies	$165.00
White Memorial Hospital★	Los Angeles	F. B. Moor	33,606	———	———	———	120.00
Stanford University Hospitals★‡	San Francisco	W. H. Northway	———	6,833	———	7/1	50.00
University of Colorado Medical Center							
Colorado General Hospital★‡	Denver	H. L. Dinken	2,322	25,088	1	7/1	75.00
†Emory University Hospital★	Emory Univ., Ga.	R. L. Bennett	9,848	20,266	1	7/1	50.00
†Georgia Warm Springs Foundation	Warm Springs, Ga.		889	1,108	2	———	———
Cook County Hospital★‡	Chicago	D. Kobak	3,357	33,282	———	1/1, 7/1	———
Michael Reese Hospital★‡	Chicago	C. O. Molander	1,607	19,443	1	Varies	25.00
Northwestern University Medical School	Chicago		13,284	34,813	———	———	———
University of Kansas Medical Center★	Kansas City, Kan.	D. L. Rose	11,684	31,838	1	7/1	100.00
†Massachusetts General Hospital★	Boston		———	———	———	———	———
University of Minnesota Hospitals★‡	Minneapolis	M. Knapp	15,391	21,885	4	———	105.00
Mayo Foundation	Rochester, Minn.	F. H. Krusen	———	———	9	Varies	92.50
Barnes Hospitals★	St. Louis		820	10,951	———	7/1	25.00
†Bellevue Hospital, Div. III—							
New York University★	New York City		———	———	———	———	———
Goldwater Memorial Hospital★‡	New York City		2,799	124,357	———	———	———
†Hospital for Joint Diseases★‡	New York City	I. Weiss	76,070	93,036	1	7/1	40.00
Hospital for Special Surgery	New York City	K. G. Hansson	———	41,111	———	———	———
Montefiore Hosp., for Chronic Diseases★‡	New York City	K. Harpuder	———	———	———	———	———
Mount Sinai Hospital★	New York City	W. Bierman	———	———	———	7/1	50.00
New York City Hospital★‡	New York City	F. K. Safford, Jr.	955	26,418	———	———	———
†Presbyterian Hospital ★‡	New York City	W. B. Snow	70,405	191,021	2	1/1	41.66
St. Luke's Hospital★	New York City	R. Muller	1,202	126,904	1	7/1	50.00
†Rehabilitation Hospital ‡	W. Haverstraw, N. Y.	M. Hoberman	322	291,116	1	———	200.00
Cleveland Clinic Hospital ‡	Cleveland	S. G. Gamble	17,385	17,884	1	7/1	135.00
Hospital of the Univ. of Pennsylvania★‡	Philadelphia	G. M. Piersol	1,396	15,575	1	Varies	100.00
Philadelphia General Hospital★‡	Philadelphia		3,073	21,769	———	———	———
Medical College of Virginia, Hosp. Div.★	Richmond, Va.	F. A. Hellebrandt	3,787	34,009	———	———	———
State of Wisconsin General Hospitals★‡	Madison, Wis.	H. D. Bouman	3,783	45,840	———	———	———

The star (★ indicates hospitals approved for training interns.
The dagger (†) indicates temporary approval.
‡ Residencies open to women.
§ Includes Fellowships.
n Salary established by government pay tables.
** Reprinted in part J. A. M. A. 142:1195 (April 15) 1950.

AMERICAN CONGRESS OF PHYSICAL MEDICINE

MIDWESTERN SECTION SPRING SESSION

MONDAY, FEBRUARY 19, 1951

University of Kansas Medical School **Kansas City, Kansas**

There will be an all day session on physical medicine and rehabilitation which is open to physicians, other professional personnel and their guests. Papers will be presented from Washington University, St. Louis, University of Illinois, Chicago State University of Iowa and the Mayo Clinic. For detailed information write the Secretary, Dr. Donald J. Erickson, Section on Physical Medicine and Rehabilitation, Mayo Clinic, Rochester, Minn.

Chairman,
WILLIAM D. PAUL, M.D.,
University Hospitals,
State University of Iowa,
Iowa City, Iowa

Secretary,
DONALD J. ERICKSON, M.D.,
Section on Physical Medicine and Rehabilitation,
Mayo Clinic, Rochester, Minn.

AMERICAN CONGRESS OF PHYSICAL MEDICINE

SPRING SESSION

EASTERN SECTION

In Conjunction with the New England Society of Physical Medicine, the Section on Physical Medicine of the Medical Society of the County of Kings, the New Jersey Society of Physical Medicine, the New York Society of Physical Medicine, the Pennsylvania Academy of Physical Medicine and the Society of Physical Medicine of the District of Columbia.

SATURDAY, April 28, 1951

Nurses' Lecture Hall, Philadelphia General Hospital

34th Street and Curie Avenue **Philadelphia 4, Pa.**

Dinner at 6:30 P. M. — Penn-Sheraton Hotel.

Physicians, Other Professional Personnel and Their Guests Are Welcome.

Chairman,
Sidney Licht, M.D.,
30 Hillside Ave.,
Cambridge, Mass.

Secretary,
Albert A. Martucci, M. D.,
Abington Memorial Hospital,
Abington, Pa.

MEETINGS OF INTEREST TO THOSE IN THE FIELD OF PHYSICAL MEDICINE

American Congress of Physical Medicine. — 29th Annual Session, Shirley-Savoy Hotel, Denver, Colo., Sept. 4, 5, 6, 7, 8, 1951. Walter J. Zeiter, M.D., Chairman, Convention Committee, 30 North Michigan Ave., Chicago 2.

Section on Physical Medicine and Rehabilitation of the American Medical Association. — Wednesday, Thursday and Friday morning of the A.M.A. meeting (June 11-15, 1951) in Atlantic City. Secretary, Walter J. Zeiter, M.D., Cleveland Clinic Foundation, 2020 E. 93rd Street, Cleveland 6, Ohio.

Eastern Section, American Congress of Physical Medicine. — Philadelphia, Saturday, April 28, 1951. Albert A. Martucci, M.D., Secretary, Abington Memorial Hospital, Abington, Pa. *See announcement, elsewhere this issue.*

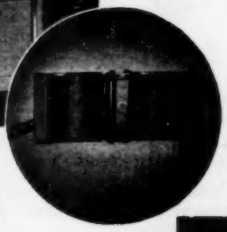
Midwestern Section, American Congress of Physical Medicine. — Kansas City, Kan., Monday, Feb. 19, 1951. Donald J. Erickson, M.D., Secretary, Section on Physical Medicine and Rehabilitation, Mayo Clinic, Rochester, Minn. *See announcement elsewhere, this issue.*

New York Society of Physical Medicine. — Meetings, first Wednesday. Madge C. L. McGuinness, M.D., Secretary, 48 E. 62nd St., New York 21, N. Y.

Pennsylvania Academy of Physical Medicine. — Meetings, third Thursday. Charles Furey, M.D., Secretary, Department of Physical Medicine, Jefferson Medical College, 10th and Sanson Streets, Philadelphia 7.

Chicago Society of Physical Medicine and Rehabilitation. — Meetings, fourth Wednesday, January, through May, 1951. Next meeting Wednesday, January 24, Loyola University Medical School, 706 South Wolcott Ave., Chicago, 8 P. M., Lecture Room A. Arthur A. Rodriquez, M.D., Secretary, 30 North Michigan Ave., Chicago 2.

Latin-American Congress of Physical Medicine. — Third Congress of physicians of the Latin countries and the United States interested in Physical Medicine, Ciudad Trujillo, Dominican Republic, March 21-26, 1951. Secretary, Madge C. L. McGuinness, M.D., 48 East 62nd St., New York 21, N. Y. H. A. Sonn, program chairman, Room 600, 110 East 23rd St., New York 10, N. Y.



Choose Your Short Wave Diathermy Wisely

FISCHER De Luxe Model 400 offers . . .

Inductance Applications with the
PATENTED ADJUSTABLE INDUCTION ELECTRODE,
or inductance cable

Condenser Electrode Applications with
AIR SPACED ELECTRODES, pads and other designs

Minor Electrosurgery and any degree of Coagulation

FISCHER De Luxe Model 400 is the highly efficient, practically trouble-free, self-excited oscillator type—no crystal control or master oscillator.

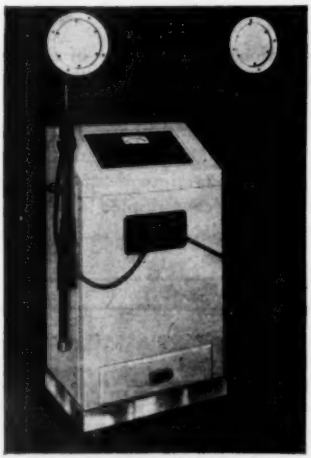
ACCEPTED
COUNCIL ON PHYSICAL MEDICINE
AMERICAN MEDICAL ASSOCIATION

- A.M.A. ACCEPTANCE
- F.C.C. TYPE APPROVAL D-500
- UNDERWRITERS' LABORATORIES APPROVAL
- CANADIAN TYPE APPROVAL Number 7

Patented Adjustable Induction Electrode, designed especially to fit any part of the body, gives even distribution of heat over entire treatment area.

Write for FREE copy of Federal Communications Commission's questions and answers digest of regulations on operation of medical diathermy equipment.

H. G. FISCHER & CO. • Franklin Park, Illinois



Hogan Brevatherm Model No. 8920

STILL IN FRONT

McIntosh Short Wave Diathermy Equipment is still in the lead.

New engineering makes the Hogan Brevatherm Model No. 8920, F. C. C. Type Approval No. D-528, an outstanding value with ample power for the busy hospital or clinic and most sensitive control of output. You who have used diathermy equipment of our make for a third of a century (half of our life-time) are best able to judge the correctness of our assertion.

McINTOSH ELECTRICAL CORP.

72nd Anniversary, Feb. 4, 1951

In N. Y.
NYROPE, INC.
1814 Crotona Ave., N. Y. C.
Phone: LUdlow 4-7080

FACTORY AND MAIN OFFICE
227 N. California Ave.
Chicago 12, Illinois

☐ Literature please on Model No. 8920.
☐ Please have representative call

DR.....

ADDRESS.....

CITY..... STATE.....

A. P. M.

Georgia Warm Springs Foundation
GRADUATE COURSE

Physical Therapy and Occupational Therapy in the Care of Poliomyelitis

This course is open to graduates of approved schools in physical therapy and occupational therapy. Such graduates must be members of the American Physical Therapy Association and/or the American Registry of Physical Therapy Technicians, and Occupational Therapy Association.

Tuition: None. For Scholarship to Cover Transportation and Maintenance Contact, National Foundation for Infantile Paralysis, 120 Broadway, New York 5, New York.

Entrance Dates: First Monday in January, April, July and October.

Duration of Course: The Course is divided into two parts:

Part I. Over-all care of convalescent polio with particular emphasis and special training in muscle testing and muscle reeducation.

Part II. Particular emphasis and special training in functional testing and functional retraining.

Each Part lasts three months and only selected students who have completed Part I will be admitted to Part II. All students applying for Part I must be willing to remain through Part II if selected.

For Information Write:

ROBERT L. BENNETT, M.D.
Georgia Warm Springs Foundation
WARM SPRINGS, GEORGIA

The Golseth-Fizzell Model DS

CONSTANT CURRENT IMPULSE STIMULATOR

U. S. Pat. No. 2498882

A portable, scientifically designed stimulator which provides physical therapy and the following diagnostic and prognostic aids.

Galvanic tetanus ratio — rheobase and chronaxis measurements — strength duration curves — and repetitive stimuli tests. An electronic circuit automatically produces pre-set galvanic stimuli, adjustable in strength from 0 to 25 ma. and in duration from 1 ms. to 1½ seconds.

Please Write for Additional Details.

CHICAGO MEDICAL ELECTRONICS LAB., INC.
6425 N. Avondale Chicago 31, Ill.

In that precious instant when newborn life hangs in the balance . . . the dependable E & J resuscitator can mean victory . . . and the first welcome cry of *life*.

The E & J machine adjusts itself to even the tiny lungs of premature infants, signals the operator when aspiration is required to remove mucus or other foreign matter, breathes for the baby until natural breathing is firmly established.

The equipment enables your hospital to take positive, effective action when there is acute danger of a newborn life slipping away forever. You may see a demonstration at no obligation...just write or phone any of the offices listed.

The Breath of Life

RESUSCITATOR
ASPIRATOR
INHALATOR

E & J MANUFACTURING CO.
Glendale 1, California

Sales, Service Centers: Philadelphia, Pittsburgh, Boston, New York, Chicago, Oakland, Seattle, Salt Lake, Detroit, San Antonio.

WANTED

Physical Therapist, graduate of an accredited school for a 60 bed children's orthopedic hospital, all charity. Two weeks' sick leave and one month's vacation with pay after one year. Salary open. Write, Superintendent, Scottish Rite Hospital for Crippled Children, Decatur, Georgia.

OPPORTUNITIES AVAILABLE

WANTED — (1) PHYSICAL THERAPISTS FOR FOLLOWING: (a) Group of American Board specialists operating own hospital; resort area, Southwest. (b) New department, fairly large general hospital; Philadelphia area. (c) To take charge of department; new rehabilitation center of industrial compensation patients of large insurance company; Chicago area. (d) Chief of department, 200-bed hospital; $300, complete maintenance; college town. (e) New rehabilitation center; vocational and physical rehabilitation programs; university affiliations; South. (f) Two public health nurses trained in physical therapy and, also, public health nurses interested in obtaining training in physical therapy; salaries for former $4400-$5500, salary for training, $3660-$4380; public health agency. (g) Group appointment, all Diplomates or Board eligible; diversified case load; university town of more than 100,000, Midwest; minimum $3600. (h) To join staff of one of leading hospitals in Southern California. (2) **SPEECH CORRECTIONIST:** Master's degree and experience with cerebral palsied children desirable; children's hospital; East.

For further information, please write Bureaus Larson, Medical Bureau, Palmolive Building, Chicago.

Meets every requirement for all diathermy technics...

the GE INDUCTOTHERM

FROM diathermy treatment of the ear to that of a pelvis or chest — the GE Inductotherm meets the most exacting clinical approval. Brings you the practical, the efficient, the easy means for obtaining the desired quality and intensity of energy indicated for proper treatment.

As for output, the Inductotherm has the capacity to elevate the temperature in any region of the body to the limit of the patient's tolerance. The perfect answer to fulfill your needs over the *entire range* of modern diathermy technics.

Ask your GE representative for more details about the Inductotherm — or write General Electric X-Ray Corporation, Dept. 0-1, Milwaukee 14, Wisconsin.

GENERAL ELECTRIC
X-RAY CORPORATION